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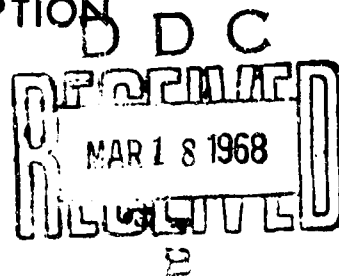
OCD Work Unit 4113E

# DETROIT CIVIL DEFENSE OPERATING SYSTEM SYNTHESIS

## VOLUME I PRELIMINARY SYSTEM DESCRIPTION

by

Robert N. Hendry



Prepared For

Office of Civil Defense  
United States Department of the Army  
Contract No. OCD-PS-64-56

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PRELIMINARY REPORT  
OU-230-2

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RESEARCH TRIANGLE INSTITUTE  
Operations Research and Economics Division

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Volume I

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DETACHABLE SUMMARY

The Detroit Civil Defense System is described in this volume; the technical approach to this description is presented in a second volume. The description is presented in a specification format to show concisely the relationship between components and missions. The total system and each subset of components is described by (1) mission and performance requirements, (2) components, and (3) operations. Subsequently, systems analysis of the combined effects is expected to yield realistic performance and cost characteristics.

A local civil defense system is conceptualized as a four-component organization, consisting of resources derived from the community, and working together as subsystems to solve local problems resulting from a nuclear attack. Central control (headquarters) directs and coordinates the other three. The shelter (central countermeasure) subsystem is concerned with warning, guiding to shelter, shielding, and sustaining occupants during and following the attack, as well as radiological monitoring to determine whether it is unsafe to stay or safe to leave shelter. The extra-shelter subsystem is a mobile force put together to fight fires, clear debris, rescue, assist in remedial movement, and to otherwise overcome environmental hazards affecting the safety of the sheltered population. Finally, the support subsystem assists the other three by providing communication, transportation, supplies, and personnel; this subsystem responds to requests from the other subsystems rather than initiating action in defense of the population. This concept of assigning responsibilities is comparable to the efficient military organizations which have proven most successful in emergency situations.

The Detroit CD system is represented by an operating area schematic and a time-phased set of control functions together with a resource matrix. The schematic describes a composite of services united in a controlled countermeasures operation to solve a problem in a specific area. The resource organization assignment matrix relates the service function to the component organization. Deployment of resources to a specific operating area is shown in a schematic block diagram which represents the basic civil defense operating subsystem. The total system should be visualized as many of these basic subsystems operating simultaneously under the control of an emergency operating center.

A diagrammatic description was adopted instead of a narrative, picture, etc., as the best means for showing the functional and physical aspects of the system. Functional flow block diagrams (FFBD) show the central control, deployment, and countermeasures operation. The schematic block diagram (SBD) shows the physical displacement of the organization for subsequent analysis. The key countermeasures operation diagram was

evolved from the problem definition of each operating area and from the available countermeasures needed to solve it. A set of similar diagrams representing most, if not all, countermeasure operations likely to be encountered in the Detroit area will be developed during continuing work.

Supporting research studies are recommended to establish a standardized land-use classification and casualty and property-damage functions as a basis for system-oriented problem definitions. Studies in system synthesis should continue in greater detail and should be supported by objective selection and systems analysis studies to insure that an appropriate interface exists between problem definition and system evaluation. Continuing system studies can be expected to expand this beginning into a comprehensive description which can be useful in system evaluation within the Five-City Studies and, subsequently, within the Damage-Limiting Studies. Ultimately, systems analyses can be expected to help minimize city damage from nuclear attack.

## FOREWORD

The description and approach covering the synthesis of one or more total near-future civil defense systems was performed under the Office of Civil Defense Contract No. OCD-PS-64-56, Modification No. 15 dated 1 May 1967. Initially, work was assigned to Work Unit 4113E. This number has been changed to 4126A for the continuing effort.

Volume I offers a preliminary description of a total civil defense system at the local level. Detroit's CD system was selected as a specific case for study. It is intended that subsequent research will improve this initial description and provide a basis for describing competing system concepts. If system alternatives can be described in a manner comparable to the Detroit study, quantitative systems analysis can be expected to yield performance criteria that will make selection of the most effective alternative possible.

Volume II describes the technical approach to the system synthesis and indicates that it will be suited to the Five-City Study. Subsequent work will continue to develop this approach as a means for unifying research effort to achieve civil defense objectives.

The author expresses his indebtedness to Mr. Charles Kepple of the Research Directorate of the Office of Civil Defense for assistance in providing materials, arranging briefings and conferences, and in reviewing and making recommendations as the study progressed. The author also expresses his appreciation to Mr. Philip McMullan, Group Leader, and to others in the Research Triangle Institute who provided guidance and support during this system study.

## TABLE OF CONTENTS

|  | <u>Page</u> |
|--|-------------|
| FOREWORD . . . . .                                 | ii          |
| LIST OF FIGURES . . . . .                          | iv          |
| LIST OF TABLES . . . . .                           | v           |
| 1.0 SUMMARY . . . . .                              | 1           |
| 2.0 GENERAL INFORMATION . . . . .                  | 4           |
| 2.1 Purpose and Applicability . . . . .            | 5           |
| 2.2 Explanation of Terms . . . . .                 | 5           |
| 2.3 Approach . . . . .                             | 6           |
| 3.0 TOTAL DETROIT CIVIL DEFENSE SYSTEM . . . . .   | 7           |
| 3.1 Mission and Performance Requirements . . . . . | 8           |
| 3.2 System Components . . . . .                    | 8           |
| 3.3 Schematic Operating Plan . . . . .             | 9           |
| 3.4 Performance Capabilities . . . . .             | 13          |
| 3.5 Cost Estimates . . . . .                       | 16          |
| 4.0 CENTRAL CONTROL SUBSYSTEM . . . . .            | 17          |
| 4.1 Headquarters Service . . . . .                 | 18          |
| 5.0 SHELTER SUBSYSTEM . . . . .                    | 22          |
| 5.1 Welfare Service - Sheltering . . . . .         | 23          |
| 5.2 Warden Service - Moving to Shelter . . . . .   | 23          |
| 5.3 Medical Service - RADEF . . . . .              | 23          |
| 5.4 Communication and Warning Service . . . . .    | 26          |
| 6.0 EXTRA-SHELTER SUBSYSTEM . . . . .              | 30          |
| 6.1 Medical Service . . . . .                      | 31          |
| 6.2 Engineering Service . . . . .                  | 33          |
| 6.3 Fire Service . . . . .                         | 39          |
| 6.4 Police Service . . . . .                       | 45          |
| 6.5 Rescue Service . . . . .                       | 46          |
| 6.6 Welfare Service . . . . .                      | 50          |
| 7.0 SUPPORT SUBSYSTEM . . . . .                    | 57          |
| 7.1 Transportation Service . . . . .               | 58          |
| 7.2 Communication and Warning Service . . . . .    | 59          |
| 7.3 Supply and Personnel Service . . . . .         | 64          |

# LIST OF FIGURES

| <u>Figure</u> |   | <u>Page</u> |
|---------------|---|-------------|
| 1             | Detroit Civil Defense Organization . . . . .            | 10          |
| 2             | Detroit Civil Defense System Diagram . . . . .          | 11          |
| 3             | Time-Phased Central Control Operations . . . . .        | 12          |
| 4             | Control and Mobilization Points . . . . .               | 15          |
| 5             | Central Control Operations . . . . .                    | 21          |
| 6             | Population Percent Protected by NFSS Shelters . . . . . | 24          |
| 7             | Shelter Operations . . . . .                            | 25          |
| 8             | RADEF (Engineering) Station Distribution . . . . .      | 27          |
| 9             | RADEF Operations . . . . .                              | 28          |
| 10            | Major Medical Facilities Distribution . . . . .         | 34          |
| 11            | Medical Care Operations . . . . .                       | 37          |
| 12            | Engineering Facilities Distribution . . . . .           | 40          |
| 13            | Engineering Operations . . . . .                        | 41          |
| 14            | Firefighting Facilities Distribution . . . . .          | 43          |
| 15            | Fire Service Operations . . . . .                       | 44          |
| 16            | Police Facilities Distribution . . . . .                | 47          |
| 17            | Police Service Operations . . . . .                     | 48          |
| 18            | Rescue Facilities Distribution . . . . .                | 51          |
| 19            | Rescue Service Operations . . . . .                     | 52          |
| 20            | Welfare Facilities (Schools) Distribution . . . . .     | 55          |
| 21            | Welfare Service Operations . . . . .                    | 56          |
| 22            | Transportation Facilities Distribution . . . . .        | 60          |
| 23            | Major Highway Distribution . . . . .                    | 61          |
| 24            | Major Rail Distribution . . . . .                       | 62          |
| 25            | Transportation Service Operations . . . . .             | 63          |
| 26            | Radio Facilities Distribution . . . . .                 | 66          |
| 27            | Telephone Exchange Distribution . . . . .               | 67          |
| 28            | Communication Service Operations . . . . .              | 68          |
| 29            | Supply and Personnel Service Operations . . . . .       | 70          |



LIST OF TABLES

| <u>Table</u> |  | <u>Page</u> |
|--------------|--|-------------|
| I            | Countermeasures Operations Synthesis . . . . . | 14          |
| II           | Detroit Medical Facilities . . . . .           | 35          |
| III          | Civil Defense Radio Systems . . . . .          | 65          |

**Section 1.0**

**SUMMARY**

## DETROIT CIVIL DEFENSE OPERATING SYSTEM SYNTHESIS

### Volume J - Preliminary System Description

#### 1.0 SUMMARY

The Detroit Civil Defense System is described in this volume; the technical approach to this description is presented in a second volume. The description is presented in a specification format to show concisely the relationship between components and missions. The total system and each subset of components is described by (1) mission and performance requirements, (2) components, and (3) operations. Subsequently, systems analysis of the combined effects is expected to yield realistic performance and cost characteristics.

A local civil defense system is conceptualized as a four-component organization, consisting of resources derived from the community, and working together as subsystems to solve local problems resulting from a nuclear attack. Central control (headquarters) directs and coordinates the other three. The shelter (central countermeasure) subsystem is concerned with warning, guiding to shelter, shielding, and sustaining occupants during and following the attack, as well as radiological monitoring to determine whether it is unsafe to stay or safe to leave shelter. The extra-shelter subsystem is a mobile force put together to fight fires, clear debris, rescue, assist in remedial movement, and to otherwise overcome environmental hazards affecting the safety of the sheltered population. Finally, the support subsystem assists the other three by providing communication, transportation, supplies, and personnel; this subsystem responds to requests from the other subsystems rather than initiating action in defense of the population. This concept of assigning responsibilities is comparable to the efficient military organizations which have proven most successful in emergency situations.

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**Section 2.0**

**GENERAL INFORMATION**

## 2.0 GENERAL INFORMATION

### 2.1 Purpose and Applicability

The synthesis is intended to establish a basic approach to describing a local civil defense system. The description was derived from a study of the Detroit CD system <sup>1/</sup> within the context of Civil Defense Research Analysis<sup>2/</sup> and Systems Analysis in Civil Defense, Parts I and II <sup>3/</sup> by John F. Devaney.

A specification format was adopted to reveal the system structure.

### 2.2 Explanation of Terms

- 2.2.1 Mission--a task to be undertaken or an objective to be accomplished (i.e., civil defense). The option distinguishes between continuous and discrete assignments. Mission assignments may or may not have a value function attached.
- 2.2.2 System--a group of related components operating together to achieve a mission.
- 2.2.3 Synthesis--the process by which the basic components and their functions or operations are assembled into a system.
- 2.2.4 Description--the product of a synthesis intended to convey a mental image of a system meeting specified requirements, consisting of a defined set of components, and accomplishing its objective by a definite set of operations.
- 2.2.5 Performance requirements--the limits beyond which performance of the mission is unacceptable and thus the criteria as to whether the mission has or has not been achieved by a system with specific performance capabilities and cost characteristics. (The synthesis task is given as much freedom as possible in providing candidates for analysis.)
- 2.2.6 Component--a part of the system otherwise identified as a subsystem, service, unit, team, individual, or other subordinate level in a hierarchy of elements.
- 2.2.7 Function (Integrator)<sup>4/</sup>--an action performed by the system or one of its components. Three types of functions are recognized; namely, countermeasure, control, and support. Countermeasures (CM) produce direct effects; controls insure that the effects are the intended ones; and support actions produce intermediate results that help the other two perform their missions. An operation is a set of functions of any type.

---

<sup>1/</sup> P. C. McGillivray, Detroit Civil Defense Plan, City of Detroit Office of Civil Defense, February 1966.

<sup>2/</sup> Devaney, Civil Defense Research Analysis, Research Report No. 11, Research Directorate, OCD, Dec. 15, 1966.

<sup>3/</sup> Devaney, Systems Analysis in Civil Defense, Parts I and II, Systems Evaluation Division, Research Directorate, OCD, August 1965.

<sup>4/</sup> Ibid, p. 47.

2.2.8 Operating area--a bounded geographic locality in which CD operations take place. The basic unit of area is the census tract or standard location area (SLA); these units may be aggregated into zones, sectors, or both. Zones may take on any shape; however, sectors are aggregates in the form of radial slices of an annular ring about ground zero.

2.3 Approach

The total CD system and each component is described by missions, requirements, components, and operations; these descriptors indicate the objective, functions, physical characteristics, and qualitative performance.

Estimated cost and effectiveness of the total system cannot be adequately developed without a systems analysis; total cost must reflect the building system as well as the operating system. Moreover, component cost is not valid until the equipment level has been described; at this level, every significant hardware and personnel attribute has been identified, and decisions have been made regarding the effectiveness to determine whether it is cost-effective over some alternative expenditure.

For a more extensive report of this approach refer to Volume II, Technical Approach.

**Section 3.0**

**TOTAL DETROIT CIVIL DEFENSE SYSTEM**



### 3.0 TOTAL DETROIT CIVIL DEFENSE SYSTEM

#### 3.1 Mission and Performance Requirements

- 3.1.1 Mission--The Detroit CD system will provide preparation against and relief from the effects of a nuclear attack. It will broadcast public information, warn the community, control damage (as practicable), restore vital facilities, and provide relief from weapons effects to maximize the number of survivors, minimize property damage, and enable the earliest restoration of normal conditions.
- 3.1.2 Performance Requirements--Performance of the total near-future CD system is constrained to near-neighbors to present policy. Measures of performance will be based on estimates of the change in casualties, mortalities, and property damage as a consequence of the system's employment of available resources.

In pursuance of its civil defense objectives, the Detroit system will:

- (1) Enable timely mobilization in response to a defined threat.
- (2) Employ resources prior to a threatened attack in order to shelter, harden, disperse, or otherwise minimize the number of people and the amount of property damaged.
- (3) Provide timely warning and movement to shelter.
- (4) Shelter the population during the attack.
- (5) Employ resources following an attack to render relief services for survivors, to reduce property damage from fires, to decrease hazards resulting from weapons effects, to prevent further deterioration of the community, and to support recovery operations.
- (6) Make maximum use of resources within its control.

#### 3.2 System Components

A plan will be followed to use effectively all publicly-owned resources and to augment these with volunteer citizens and agencies having (or capable of having within mobilization time constraints) skills and resources that are adaptable to CD operations.

The four major components are: central control, shelter, extra-shelter, and support. These subsystems reflect the Detroit civil defense organization as currently planned,<sup>5/</sup> except that the shelter function is emphasized in contradistinction to the extra-shelter function. This separation reflects the OCD recognition of the central and peripheral countermeasures concept. This breakdown is believed necessary to recognize the fundamentally different roles in the CD operations.

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<sup>5/</sup> McGillivray, op. cit.

The next level of components includes eleven services:

- Headquarters Service
- Medical Service
- Engineering Service
- Fire Service
- Police Service
- Rescue Service
- Welfare Service
- Warden Service
- Communication and Warning Service
- Transportation Service
- Supply and Personnel Service

Each service is described in this volume.

Resources will be organized into a system as described in Figure 1, Detroit Civil Defense Organization, to perform the postattack activity (rather than preattack administrative, vulnerability reduction, and training operations). The team represents the basic component of the organization; in general, all resources, people, equipment, supplies, and facilities are allocated to teams or aggregates of teams.

### 3.3 Schematic Operating Plan

Integration of functions and components is achieved by an operating area schematic.<sup>6/</sup> At the EOC (or its alternate) planning will be in terms of shelter and CM operations which relate service functions to problems defined in specific operating areas.

Figure 2, Detroit Civil Defense System Diagram, is a schematic showing the relationship between headquarters control functions, support functions, and the CM functions. Commands to perform specific operations designed by central or intermediate control to overcome field problems flow downward through the deployment control functions to the operating team's service function. Concurrently, information flows upward describing the area problems and service needs. This cyclic flow occurs throughout the emergency period.

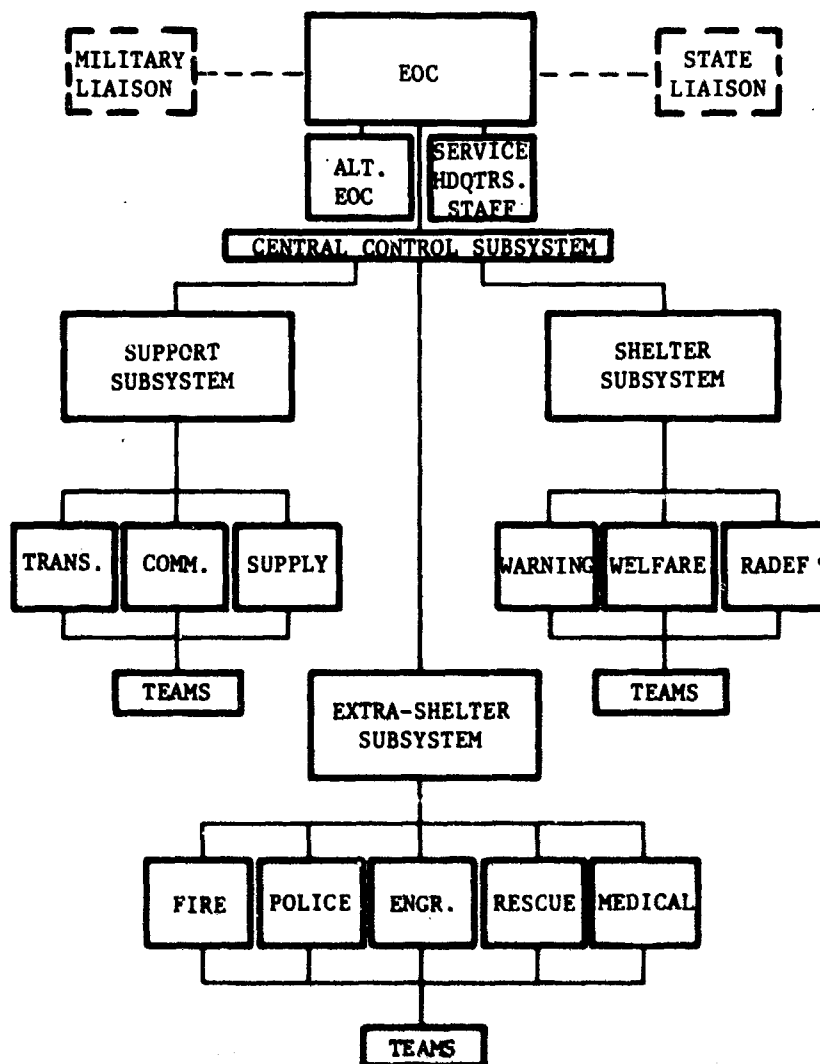
Figure 3, Time-Phased Central Control Operations, presents the time phases appropriate to the local CD system. They are superimposed on the headquarters (central control) to reflect the changes in the control problem throughout the emergency period.

As a result of prior data, the community will be subdivided into small operating areas called standard location areas (SLA's).<sup>7/</sup> Problems will be defined at the SLA level to enable adequate system evaluation.

Shelter and extra-shelter operations will be defined as a set of concurrent and/or sequential functions adopted by central or deployment control to overcome SLA problems. Figure 2 shows a specific set of actions taken by the shelter and extra-shelter subsystems. Each SLA can be analyzed to

<sup>6/</sup> See Vol. II for a detailed explanation.

<sup>7/</sup> William L. White, Roger S. Cannell, and William S. Royce, National Location Code, Palo Alto, California: Stanford Research Institute, January 1956.



Source: Adapted from Detroit Civil Defense Plans.

Fig. 1. Detroit Civil Defense Organization.

Attack Phase

Survival Phase

DISPLAY  
SHELTER  
STATUS

ANNOUNCE  
ATTACK  
"ALL CLEAR"

PLAN  
OPERATIONS

DIRECT  
OPERATIONS

DIS  
DAT

Central Control Operation (FFBD)

Deployment Control Operation (FFBD)

ESTABLISH  
HDQTRS. CONTROL

DEPLOY  
GROUP FORCES

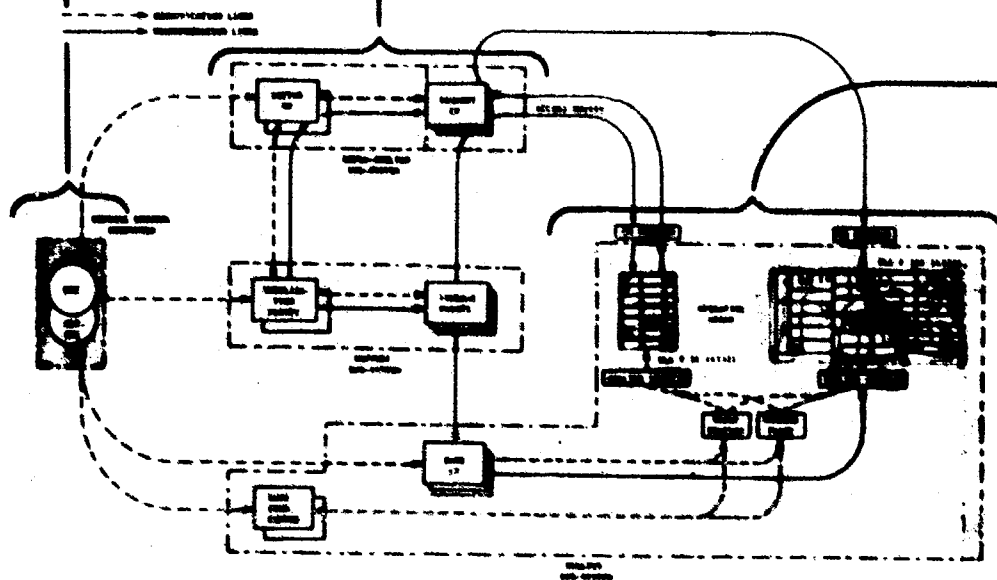
ESTABLISH  
SECTOR CONTROL

DEPLOY  
SECTOR FORCES

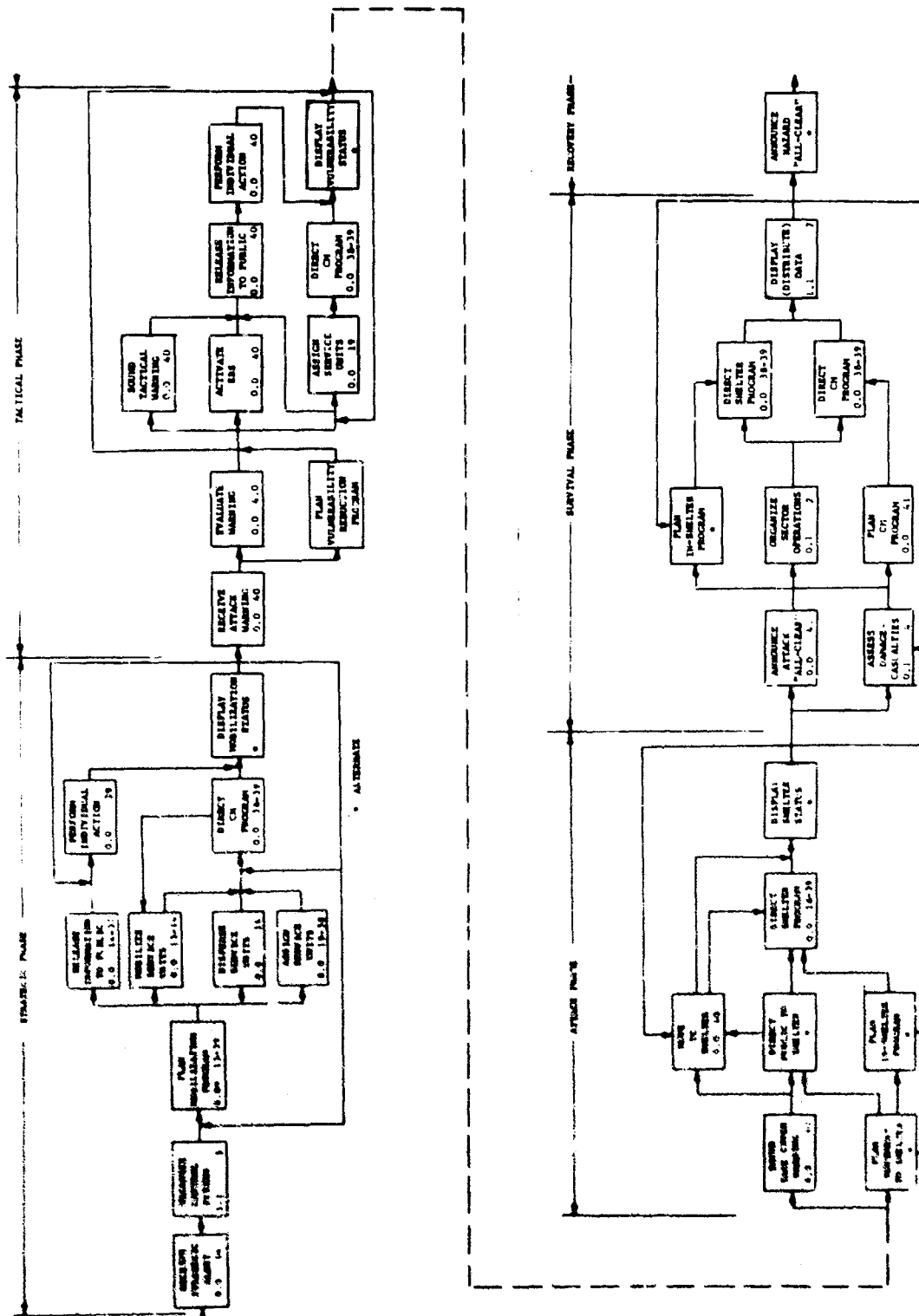
ESTABLISH  
TEAM CONTROL

FUNC  
E  
DIA  
(

BASIC  
OPERATING  
SUBSYSTEM  
SCHEMATIC







**Fig. 3. Time-phased Central Control Operations.**

determine the set of functions needed to counter the hazards threatened or caused by a nuclear weapons attack.

Table I shows the synthesis of CM operations for defined problems in specific SLA's. Expansion of this synthesis to include every SLA and all functions and situations that change with time will reveal a larger set of frequently occurring operations. Analysis of these operational patterns, together with quantification of performance parameters, will subsequently yield the total effectiveness of the system.

The area 20 to 30 miles from the central business district of Detroit (excluding the Canadian side) is designated as the Dispersed Mobilization Zone. If time and circumstances permit, civil defense forces will be dispersed to mobilization points in this zone before the attack (see Figure 4); from these points, forces will converge on the perimeter of a damaged area and form sectors. A sector, or portion of the perimeter, is about one mile long; approximately 12 sectors will be formed around the damaged area. A field headquarters will be established to coordinate and control deployment of CD operations in the sector.

### 3.4 Performance Capabilities

Civil defense performance is judged by its ability to meet performance requirements. System parameters, which enable the evaluator to judge the degree of success or failure, define the performance characteristics according to the capabilities of its components.

Qualitative measures of performance for the system can be defined:

- (1) Response time from one state to another.
- (2) Readiness, or the proportion of components that are operational.
- (3) Time to shelter Detroit's population (either total time, sheltering rate, or probability of reaching shelter).
- (4) Vulnerability of equipment, supplies, and facilities, or the fraction of the system that survives the initial effects (attack phase) to perform CD operations (based on component probability of survival).
- (5) Probability that the sheltered population will survive.
- (6) Vulnerability of the individual or the community, or the proportion that survives the survival phase (based on the summation of the number of survivors added or resources protected by each CD operation).
- (7) Vulnerability of equipment, supplies, and facilities or the fraction of resources that survive the aftereffects (survival phase) to enter the recovery phase (based on vulnerability, weapon yield, and operational figures of merit).

The numerical values (or range of values) for the qualitative measures cannot be estimated without a total systems analysis including the calculation of the effects on the casualty and property functions used in

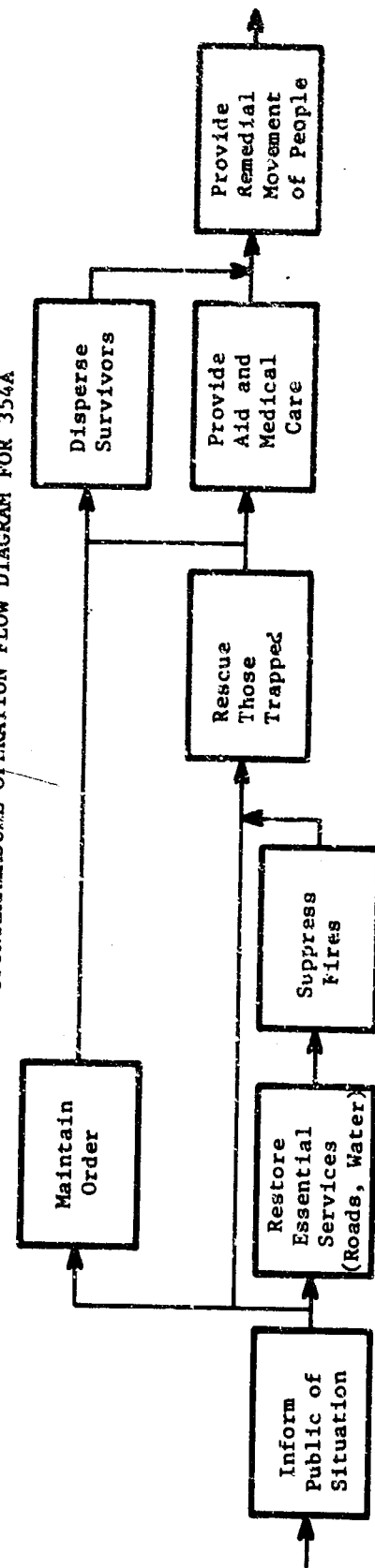
Table I

COUNTERMEASURES OPERATION SYNTHESIS

| SLA No. | Problem*<br>Definition | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---------|------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| 354A    | 5-B                    |   |   | X | X |   |   | X | X |   | X  |    | X  |    |    | X  | X  |    |    |
| 351B    | 6-C                    | X |   | X | X |   |   | X | X |   | X  |    | X  |    |    | X  |    |    |    |
| 206     | 9-C                    | X |   | X | X |   |   |   | X |   | X  |    | X  |    |    | X  |    |    |    |
| 456     | 5-A                    |   |   | X | X |   |   | X | X |   | X  |    | X  |    |    | X  | X  |    |    |
| 507     | 9-A                    | X |   | X | X |   |   |   | X |   | X  |    | X  |    |    | X  |    |    |    |

\* See Vol. II for  
Explanation

COUNTERMEASURE OPERATION FLOW DIAGRAM FOR 354A





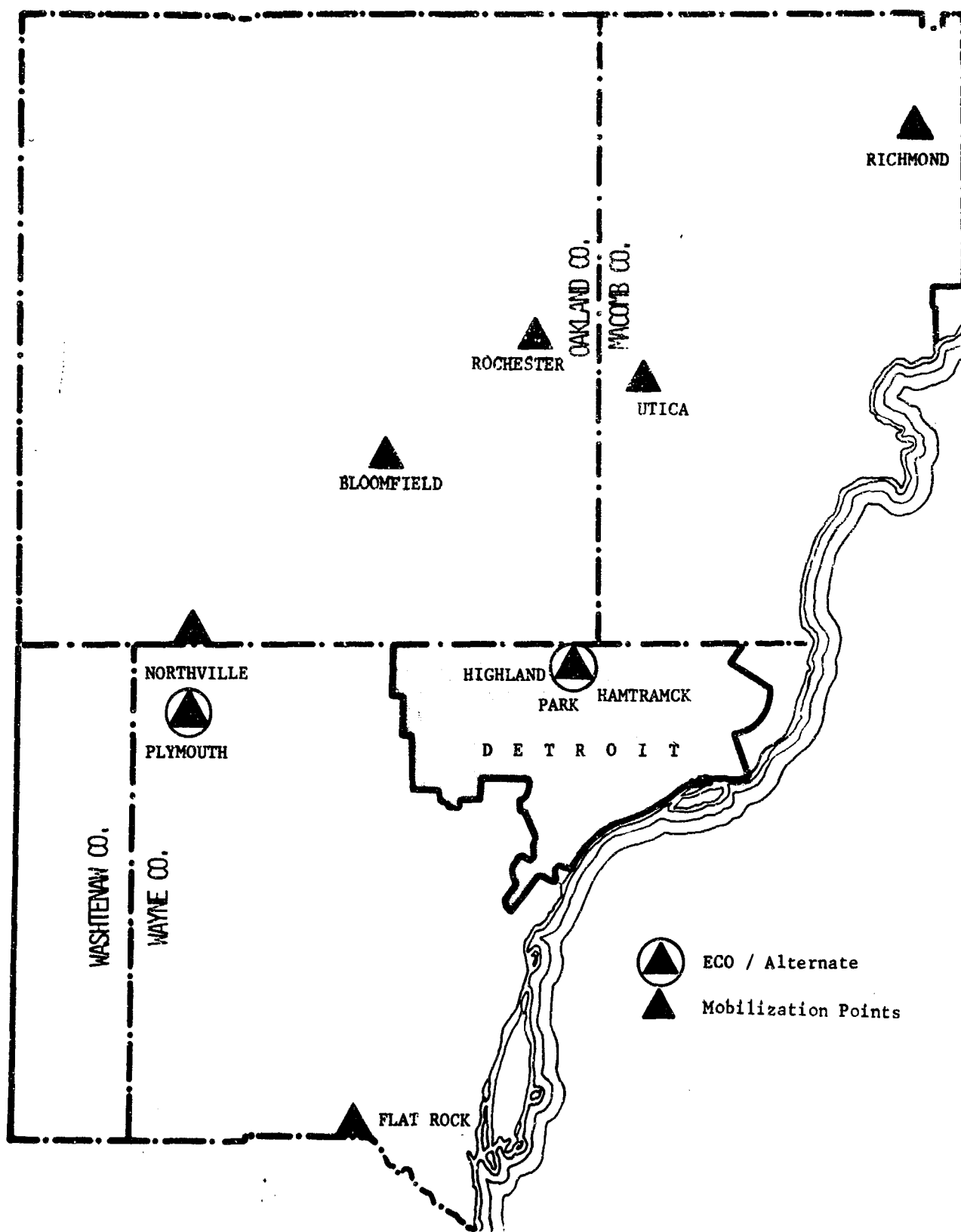


Fig. 4. Control and Mobilization Points.

the city damage calculations. When these values are available, they can be added as specific target parameters and should be incorporated as constraining limits in the performance requirements section.

### 3.5 Cost Estimates

The present study describes an existing "operating" system; nearly all costs except current operating expense have been expended and are considered nonrecoverable. Determination of total cost of a local CD system will require ground rules to enable the development of an appropriate value scheme since no real local cost constraints exist. Furthermore, assessment of voluntary help and dual-purpose systems complicate the determination of total cost. It is beyond the scope of this study to estimate cost.

**Section 4.0**

**CENTRAL CONTROL SUBSYSTEM**

#### 4.0 CENTRAL CONTROL SUBSYSTEM

##### 4.1 Headquarters Service

###### 4.1.1 Mission and Performance Requirements

- 4.1.1.1 General--The Headquarters Service will establish and operate the command and control system to make most efficient use of resources, to maximize survivors, and to minimize property damage and the time for return to normalcy. Functions include organizing, planning, informing, deciding, commanding, maintaining morale, and dispersing.

Performance requirements can be expressed in terms of reduction in fatalities and casualties, reduction in property damage and loss, reduction in time to reestablish essential services.

- 4.1.1.2 Organizing (K.1)<sup>8/</sup>--The organizing mission includes the mobilization, integration, expansion or modification of the system necessary to make maximum use of personnel and resources after the attack.

Performance requirements can be expressed in terms of time to react to a specified attack environment and time to reestablish essential services with a specified personnel and resource level.

- 4.1.1.3 Planning (K.2)--The planning mission includes the evaluation of plans for the current and anticipated situation, alternate courses of action, comparison of performance with expected standards, and initiation of changes as necessary to meet anticipated situations.

Performance requirements could be expressed as time required to promulgate a change of plans due to changes in the anticipated attack environment or casualties estimates.

- 4.1.1.4 Informing (K.3)--The informing mission consists of collecting, processing, evaluating, and disseminating data necessary for the operation of the CD system. It includes internal, lateral, and higher organization communications.

Performance requirements can be stated as percent of the population reached, scope and extent of information disseminated, and desired time for the warnings and information to reach the population. Refinements in the requirements could include the degree to which the information and warnings are understood and a comparison of population reactions.

- 4.1.1.5 Deciding (K.4)--The deciding mission is the selection of the most appropriate course of action to maximize survivors, minimize property damage, and expedite a return to normalcy.

Performance requirements can be expressed as reduction of property damage, fatalities, casualties, and time to reestablish essential services when presented with different situations and concomitant courses of action.

---

<sup>8/</sup> The parenthetical numbers provide cross reference to Devaney's Systems Analysis in Civil Defense, Part II, ch. 2 and ch. 3.

- 4.1.1.6 Commanding (K.5)--The commanding mission is the exercising of authority over the operation of the CD system. It includes a review of operations and a determination of whether the desired operations are being maintained with minimum adverse effects.

Performance requirements can be stated as a comparison of results between alternative command promulgating procedures.

- 4.1.1.7 Maintaining Morale (F.15)--The mission of maintaining morale is keeping the public informed about the situation, measures taken to improve the situation, and the condition of relatives.

Performance is classified as "high", "good", etc., according to the number of shelter incidents, confidence of the people, their willingness to accept and endure the hardships of shelter life, and similar indicators.

- 4.1.1.8 Dispersing (F.3.2)<sup>9/</sup>--The dispersing mission includes the movement of civil defense and other resources away from areas of high target value.

Performance requirements could be expressed as a reduction of resource losses for a given attack situation.

4.1.2 Components (C.1.3, C.2)

4.1.2.1 Teams and Responsibilities:

|                         |   |
|-------------------------|---|
| Command Team            | Direct the entire CD system consistent with the mission and the local and national requirements.  |
| Operations Team         | Coordinate shelter, extra-shelter, and support service operations subject to the direction of the command team (see Headquarters Team or chiefs of other individual services) |
| Communication Team      | Establish, operate, and maintain a central communication system.  |
| Administrative Team     | Provide administrative aid for entire Headquarters Service.   |
| Public Information Team | Prepare the text of all CD information for release.   |
| Broadcast Team          | Detail the radio program for broadcast.   |
| Publishing Team         | Detail the CD material for typesetting and printing.  |
| Liaison Group           | Coordinate Detroit CD operations with other CD agencies whether local, independent support, or military.  |

<sup>9/</sup> Op. cit., p. 54. This function is related but not explicitly the same as defined under F.3.2 of Devaney's Systems Analysis in Civil Defense, Part II.

#### 4.1.2.2 Personnel Source and Number:

|                      |    |
|----------------------|----|
| All City Departments | 74 |
| Other                | 8  |

The staff of the Detroit civil defense headquarters will consist of the director and employees of the OCD assigned to main and alternate control centers, the representatives of all the civil defense services, and the principal cooperating agencies and liaison officers from the military forces. There may also be personnel that the mayor may desire to have conduct administrative, fiscal, and legal matters during the emergency.

4.1.2.3 Communications--Communication equipment at the EOC will include telephones; 2-meter and 10-meter RACES radio systems; the State Conservation Radio System; local government radio systems; and access to the facilities of Emergency Broadcasting System (EBS).

4.1.2.4 Transportation--Transportation vehicles include city-owned vehicles assigned to OCD and other agency personnel, and private vehicles.

4.1.2.5 Equipment and Supplies--Control, shelter, and support resources now installed and stocked at the control centers (other than the communication and transportation items identified above) shall be supplemented as needed.

#### 4.1.2.6 Facilities (see Figure 4):

Main Control Center  
900 Merrill Plaisance  
Palmer Park  
Detroit 3, Michigan

Alternate Control Center  
Detroit House of Correction  
Five-Mile Road, west of Beck Road  
Plymouth, Michigan

#### 4.1.3 Operations (see Figure 5)



**Section 5.0**

**SHELTER SUBSYSTEM**



## 5.0 SHELTER SUBSYSTEM

### 5.1 Welfare Service - Sheltering (F.1)

- 5.1.1 Mission and Performance Requirements--The mission of the Welfare Service will be to organize and operate the shelter subsystem to protect the population from immediate and delayed weapons effects and to minimize the hardships and problems of shelter life.

Performance requirements can be expressed as a reduction in fatalities and casualties from prompt and residual weapons effect. Specifications can be stated in terms of PV, PF, square feet per shelter occupant, and comfort facilities.

- 5.1.2 Components- The NFSS shelter tabulation provides a description of shelter components; this information is summarized by SLA in Figure 6.

- 5.1.3 Operations (see Figure 7).

### 5.2 Warden Service - Moving to Shelter (F.3.4)<sup>10/</sup>

- 5.2.1 Mission and Performance Requirements--The mission of the Warden Service is the movement of people to shelters and from hazardous to less hazardous areas. This service is not currently functional in the Detroit system.

Performance requirements can be expressed as specified times for movement as well as percentage of available shelter used.

- 5.2.2 Components--The components of this service are individuals as mobilized and trained by civil defense personnel during the preattack phase.

- 5.2.3 Operations (see Figure 7)--Organization and operational plans will be developed later.

### 5.3 Medical Service - RADEF (K.3.1.1.3.2)

- 5.3.1 Mission and Performance Requirements--The mission of the Medical Service is to determine, evaluate, forecast, and disseminate information on radiological, biological, or chemical hazards resulting from an attack on Detroit or the surrounding area.

Performance characteristics can include specified time to complete a survey, time to reduce monitoring or survey data, and specified accuracy of contamination plots.

- 5.3.2 Components (C.1.3)

- 5.3.2.1 Teams and Responsibilities:

#### Headquarters Team

Provide information on radiological conditions to headquarters personnel (see Headquarters Operations Team).

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<sup>10/</sup> This function is not uniquely defined in Davaney's Systems Analysis in Civil Defense; for this reason a fourth function is added here and F.3.2 is reserved for tactical movement (dispersal in Detroit CD plans).

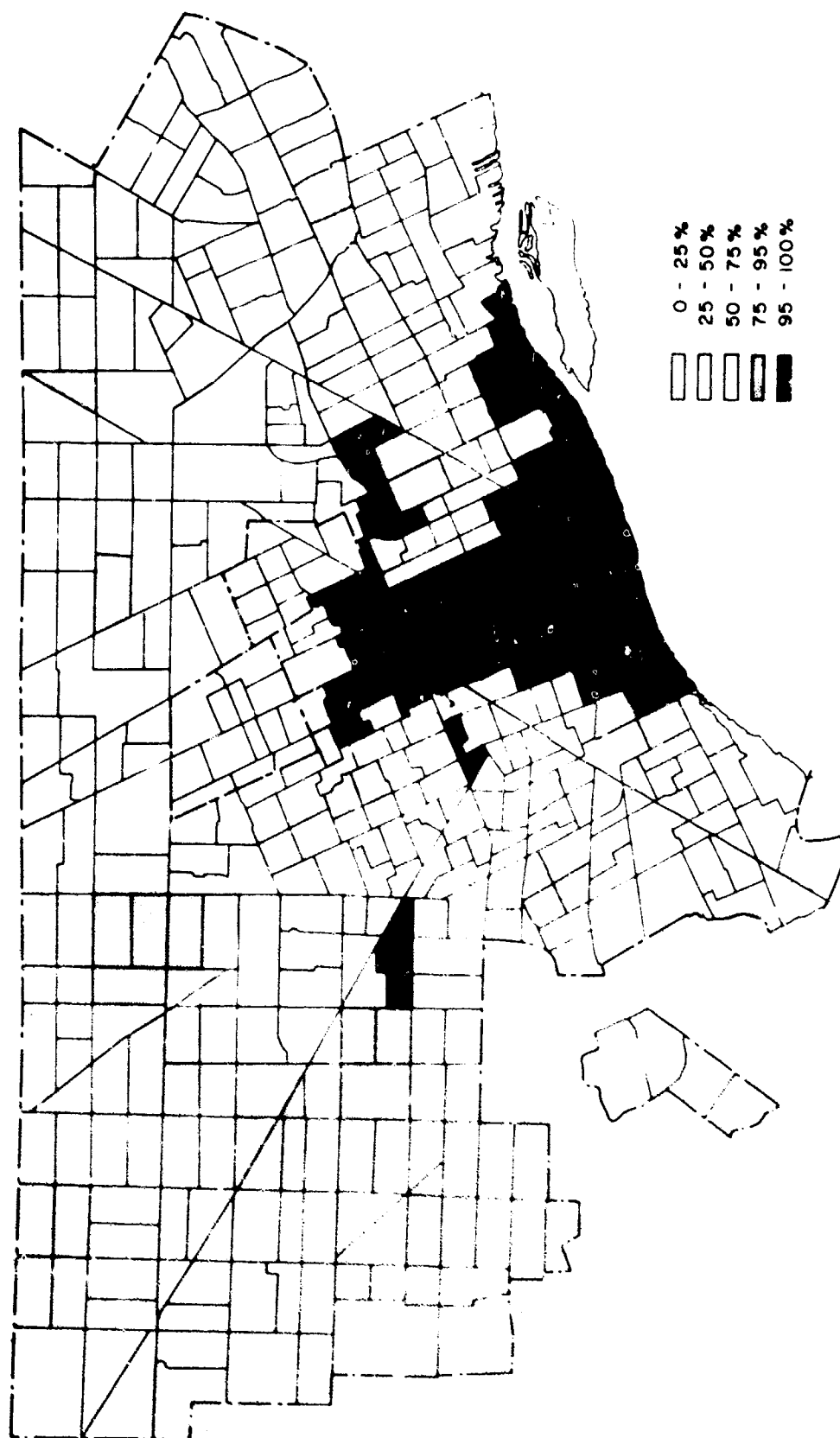
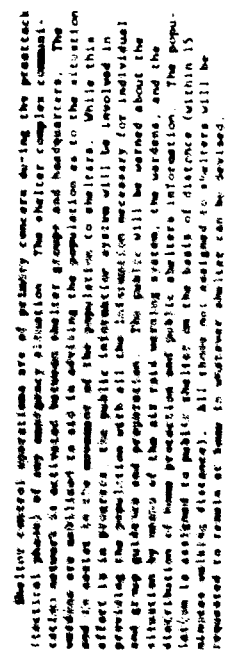


Fig. 6. Population Percent Protected by NFSS Shelters.



As the attack phase becomes more imminent, the shelter system is fully activated as it receives assigned people. Within the shelter complex and individual shelters, a number of functions are performed that parallel those encountered in the overall civil defense system. The shelter subsystem is a complete, functioning entity that provides protection for the population, both during the attack and afterwards, as dictated by fallout, during the survival phase. Its functions during this period in co-existence with the Extra-shelter and Support subsystem to provide additional support to survivors from the damage areas. The shelter groups can act as way-stations for survivors moving out of disaster areas by providing interim shelter from radiation hazards, or as lodging pending establishment of reception centers from Welfare Service.

Fig. 7. Shelter Operations.

**Reporting Team**

Supervise RADEF stations; collect and relay RADEF reports to headquarters.

**Monitoring Team**

Monitor radiological conditions at fixed sites or on RADEF reconnaissance trips as directed.

**5.3.2.2 Personnel Source and Number:**

|                     |      |
|---------------------|------|
| Medical             | 12   |
| Building and Safety |      |
| Engineering         | 404* |
| Fire                | 154  |

\* Including 180 volunteers

5.3.2.3 Communications--Fire department communications will be used by fixed RADEF stations with priority second to fire units; RACES mobiles will be assigned by the Communication Service; other emergency facilities will include public telephone and available messenger service.

5.3.2.4 Transportation--Vehicles will be assigned and equipped with a mobile radiological monitoring station. Other light vehicles will be assigned for emergency use by Transportation Service.

5.3.2.5 Equipment and Supplies--All existing equipment pertaining to radiological monitoring (including 165 CD V-777 kits), Federal supplies, and equipment as available will be assigned to RADEF units.

5.3.2.6 Facilities--Fire stations, schools, and shelters have been designated as fixed monitoring stations (Figure 8 shows fixed stations at schools which are operated by the Engineering Service in support of RADEF operations).

**5.3.3 Operations (see Figure 9)**

**5.4 Communication and Warning Service (F.2)**

5.4.1 Mission and Performance Requirements--The mission of the Communication and Warning Service is to inform the populace of a potential hazard, to direct protective action according to the instructions and information issued by the Headquarters Service (4.1.1), and to sound warnings to mark the transition from one emergency time phase to another--that is, strategic to tactical, tactical to attack, attack to survival.

Performance requirements can be stated as the percent of the population that follow the instructions and the percent of protective facilities that are used after the warning and before the attack.

**5.4.2 Components**

**5.4.2.1 Teams and Responsibilities:**

Dispatcher: Police  
Telephone Bureau

Receive initial air raid warning; disseminate by the Bell and Lights and the siren system.

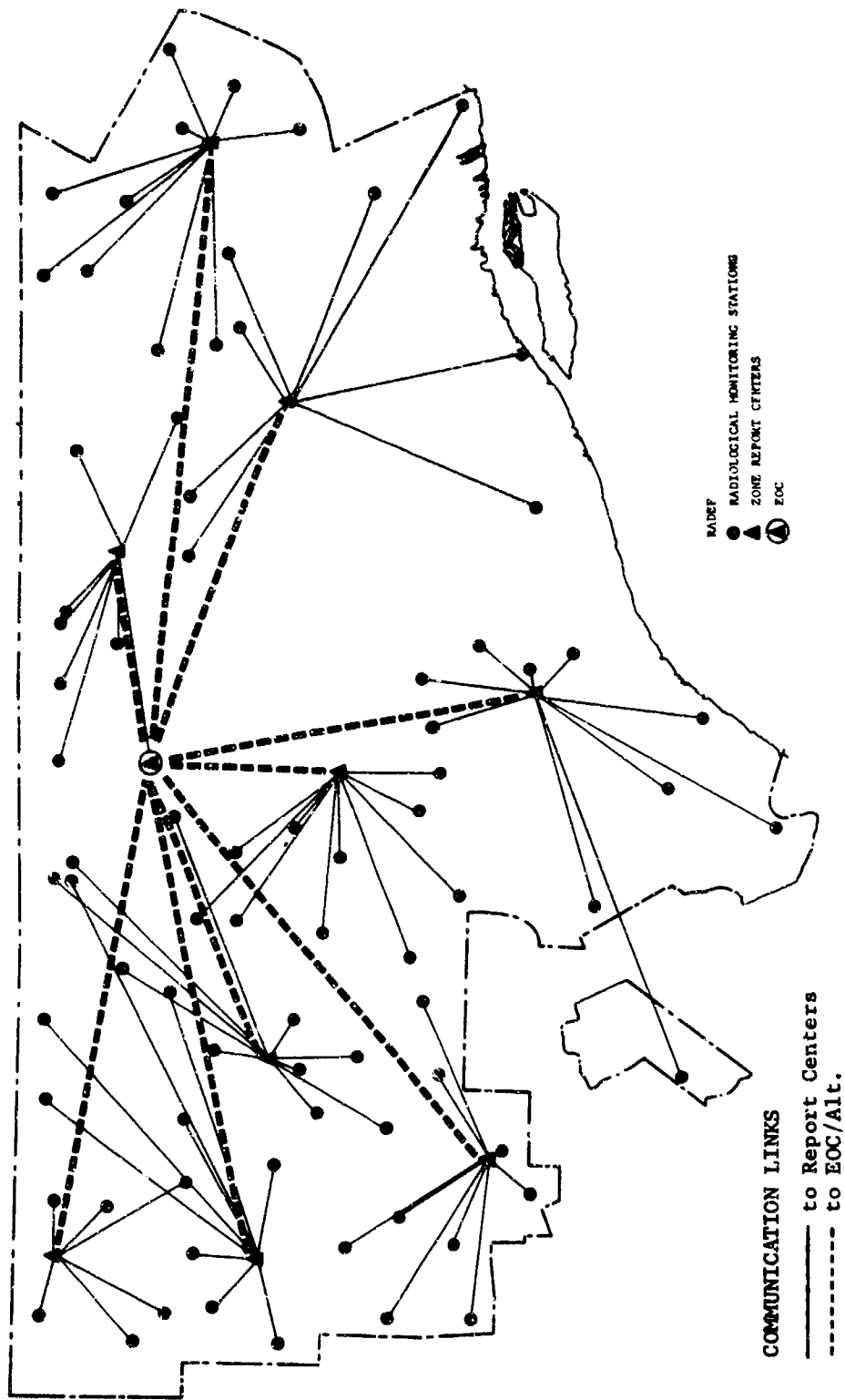


Fig. 8. RADEF (Engineering) Station Distribution.



**Emergency Broadcast Unit** Warn and advise public when Alert or Take Cover signal sounds.

**Dispatcher: Fire Service** Activate siren system manually if not  
**Headquarters** operating simultaneously with receipt of  
Take Cover signal by Bell and Lights system.

- 5.4.2.2 **Personnel Source**--Telephone dispatchers of the Police and Fire Services are assigned this function as an additional duty.
- 5.4.2.3 **Communications**--The fire department Bell and Lights system, The Outdoor Warning System (siren), and the EBS are allocated to this service.
- 5.4.2.4 **Transportation**--Police and Fire Services communications and maintenance vehicles are assigned on a priority basis.
- 5.4.2.5 **Equipment and Supplies**--Police and Fire Services communications and ancillary equipment are allocated as needed.

**Section 6.0**

**EXTRA-SHELTER SUBSYSTEM**



6.0 EXTRA-SHELTER SUBSYSTEM

6.1 Medical Service

6.1.1 Mission and Performance Requirements

- 6.1.1.1 General--The Medical Service will direct and coordinate all activity related to collection and care of casualties and will coordinate public health and mortuary services. The objective is to prevent deaths and to reduce loss of man-days of productive effort.

Performance requirements may be expressed as reduction of the loss of man-days, the incidence of illnesses due to shelter environment, the time to determine extent and intensity of radiation, and the number of burials.

- 6.1.1.2 Medical Care (F. 12)--The mission of medical care is to prevent deaths and to reduce loss of man-days whether caused by illness, injury, or other complications.

Performance characteristics can be expressed as the number of ill or injured transported to a treatment center, the number of inpatients and outpatients treated, the number of hospital beds available, and average length of incapacitation.

- 6.1.1.3 Maintaining Health (F. 6)--The health mission is to reduce spread of disease and to prevent deaths of the ill or those caring for them.

Performance requirements can be stated as the amount of water purified, sewage disposed of, refuse and garbage collected, the number and type of inoculations administered, and the specified levels of vector control.

- 6.1.1.4 Burial of Dead--The burial mission is to eliminate or reduce health hazards and psychological effects on survivors.

Performance requirements can be expressed as number of burials and burial rate.

6.1.2 Components (C.1.3, C.2)

6.1.2.1 Teams and Responsibilities:

|                     |   |
|---------------------|---|
| Service Chief       | Direct medical operations for entire CD system (see Headquarters Operations Team).            |
| Group Controllers   | Direct medical operations of teams in assigned zone.  |
| Sector Controllers  | Direct medical teams within assigned sector.  |
| Reconnaissance Team | Conduct aerial and ground reconnaissance to locate existing or potential hospital facilities. |

**First Aid Team**

Provide emergency first-aid for seriously and lightly injured survivors; arrange for remedial removal of seriously injured to existing or emergency hospital centers.

**Collecting Team**

Move litter patients from first-aid centers to emergency hospital centers and remove nonambulatory survivors from damaged areas to first-aid centers; aid in locating casualties.

**Ambulance Team**

Move nonambulatory, seriously injured to existing or emergency hospital centers.

**Emergency Treatment Team**

Locate existing facilities and establish emergency treatment centers; provide emergency treatment for nonambulatory and ambulatory seriously injured.

**Hospital Team**

Activate existing hospital facilities and care for seriously injured.

**Outpatient Treatment Team**

Establish outpatient care for lightly injured ambulatory survivors.

**Public Health Team**

Provide sanitation, hygiene, inoculation, quarantine, and vector control services.

**Burial Detail Team**

Assist Engineering Service (Burial Detail Team) in collection and burial of dead.

**6.1.2.2 Personnel Source and Number:**

|                              |       |
|------------------------------|-------|
| Health Department            | 3,600 |
| Fire Department              | 3     |
| Wayne County Medical Society | ?     |

**6.1.2.3 Communications--**Telephone communication facilities that are normally available, mobile 10-meter RACES radio systems, mobile local government radio systems, and other emergency facilities developed by Communication Services are assigned to the Medical Service.

**6.1.2.4 Transportation--**City vehicles normally assigned to the department of health, private vehicles as authorized, and light commercial vehicles that are assigned by Transportation Service for temporary use represent the capability of the service.

- 6.1.2.5 Equipment and Supplies--All available equipment and supplies in the city commonly used by the Medical Service with first priority over other services and Federal and State equipment, especially the Civil Defense Emergency Hospitals (CDEH), are allocated to the Medical Service.
- 6.1.2.6 Facilities--All medical facilities and institutions in the city (see Figure 10 and Table II) and public high schools are assigned for emergency care.

|                           |    |             |
|---------------------------|----|-------------|
| Total Number of Hospitals | 53 | 10,001 beds |
| Over 100 beds             | 28 | 8,648 beds  |
| Under 100 beds            | 25 | 1,353 beds  |

- 6.1.3 Operations--Medical care operations are described in Figure 11. Public health operations are not illustrated; they are reinstated during survival phase but are most important during the recovery phase.

## 6.2 Engineering Service

### 6.2.1 Mission and Performance Requirements

- 6.2.1.1 General--The Engineering Service will reestablish essential facilities, utilities, and communication routes by restoration of facilities, decontamination, hardening, emergency shutdown, collection and burial of the dead, and removal of debris.

Performance requirements can be expressed as the number of facilities, utilities, and communication routes reestablished, facilities restored, areas decontaminated, installations shutdown, the degree of reduction in loss of property and domestic animals, and the number of dead collected and the time required to transport to collection points.

- 6.2.1.2 Restoring Facilities (F.16.2, 16.3)--The restoring mission is to return facilities required for civil defense functions to usable condition, consistent with nature of the emergency.

Performance requirements can be expressed as the number and types of structures or facilities (such as headquarters, hospitals, utilities, transportation systems, housing, and communication centers) restored or replaced within a specified time.

- 6.2.1.3 Decontamination (F.17)--The decontamination mission is the removal of chemical, biological, or radiological contamination from areas or structures.

Performance requirements include the size of the area to be decontaminated, degree of contamination, and the time required for decontamination.

- 6.2.1.4 Hardening (F.11)--The mission of hardening is the protection of property and domestic animals against weapons effects by reducing vulnerability.

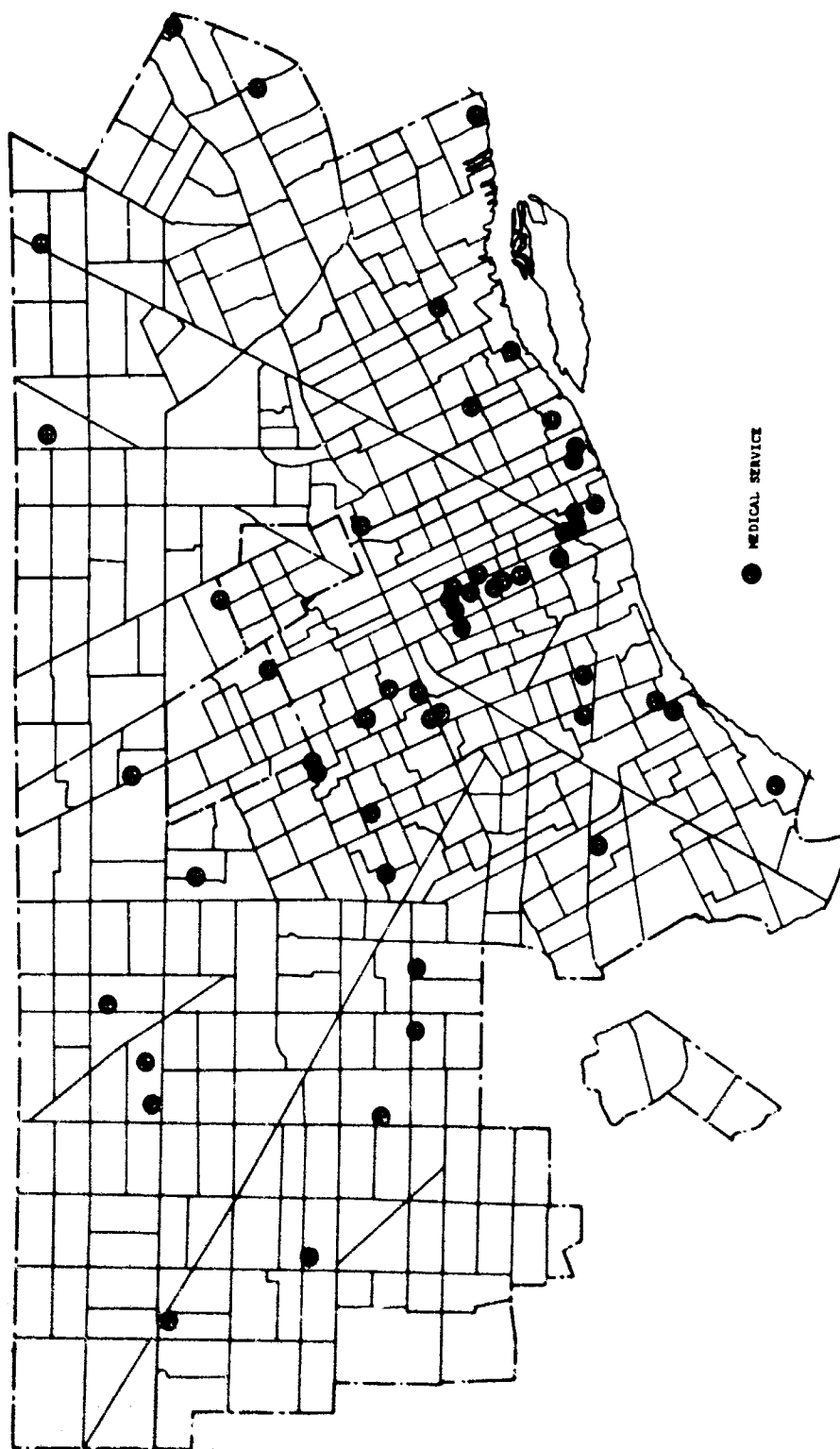


Fig. 10. Major Medical Facilities Distribution.

TABLE II  
DETROIT MEDICAL FACILITIES

| Existing Hospitals             |                     |             |
|--------------------------------|---------------------|-------------|
| Name                           | Address             | No. of Beds |
| Henry Ford Hospital            | 2799 W. Grand Blvd. | 1029        |
| Herman Kiefer Hospital         | Hamilton and Taylor | 1018        |
| Receiving Hospital             | 1326 St. Antoine    | 700         |
| Harper Hospital                | 3825 Brush          | 690         |
| Mt. Carmel Mercy Hospital      | 6071 W. Outer Dr.   | 559         |
| Grace (Northwest)              | 18700 Meyers        | 444         |
| Grace Hospital                 | 4160 John R         | 425         |
| Sinai Hospital                 | 6767 W. Outer Dr.   | 387         |
| Woman's Hospital               | 432 E. Hancock      | 357         |
| Detroit Memorial Hospital      | 1420 St. Antoine    | 335         |
| St. John Hospital              | 22101 Mack          | 292         |
| Children's Hospital            | 5224 St. Antoine    | 215         |
| Columbia Medical Hospital      | 250 E. Columbia     | 187         |
| Crittenton Hospital            | 1554 Tuxedo         | 193         |
| U. S. Public Health Service    | Windmill Pointe     | 183         |
| Zeiger Osteopathic Hospital    | 4244 Livernois      | 165         |
| Martin Place Hospital West     | 19535 Schoolcraft   | 173         |
| Metropolitan Hospital          | 1800 Tuxedo         | 156         |
| Holy Cross Hospital            | 4777 E. Outer Dr.   | 151         |
| Art Centre Hospital            | 5435 Woodward       | 150         |
| Lafayette Clinic               | 951 E. Lafayette    | 145         |
| Jennings Memorial Hospital     | 7815 E. Jefferson   | 134         |
| Saratoga Hospital              | 15000 Gratiot       | 127         |
| Brent General Hospital         | 16260 Dexter        | 120         |
| Alexander Blain Hospital       | 2201 E. Jefferson   | 110         |
| Burton Mercy Hospital          | 271 Elliot          | 106         |
| St. Clair Hospital             | 7850 E. Jefferson   | 101         |
| North Detroit General Hospital | 3105 Carpenter      | 97          |
| Boulevard General Hospital     | 1852 W. Grand Blvd. | 93          |
| Plymouth General               | 15361 Plymouth      | 83          |
| Elliott General                | 13015 W. Chicago    | 80          |
| East Side General Hospital     | 2199 Cadillac       | 80          |
| Maybury Grand Medical Hospital | 2750 Maybury Grand  | 77          |
| Lincoln Hospital               | 1053 25th St.       | 76          |
| Doctors Hospital               | 2730 E. Jefferson   | 74          |
| Lakeside General Hospital      | 995 E. Jefferson    | 72          |
| Delray General Hospital        | 7125 W. Jefferson   | 66          |
| Northwest General Hospital     | 8741 W. Chicago     | 57          |
| E. K. Thomas Memorial Hospital | 556 Garfield        | 52          |
| Kirwood General Hospital       | 301 E. Kirby        | 50          |
| Towne Hospital                 | 525 E. Grand Blvd.  | 50          |

TABLE II (Continued)

| Existing Hospitals               |                     |             |
|----------------------------------|---------------------|-------------|
| Name                             | Address             | No. of Beds |
| Park Community Hospital          | 801 Virginia Park   | 46          |
| Mercy General Hospital           | 2929 W. Boston      | 44          |
| Mt. Lebanon Hospital             | 2610 14th St.       | 34          |
| Lister General Hospital          | 10040 Yellowstone   | 33          |
| Palmer Osteopathic Hospital East | 4535 Cadieux        | 31          |
| Palmer Osteopathic Hospital      | 18160 Woodward      | 30          |
| Straith Hospital                 | 2605 W. Grand Blvd. | 29          |
| St. Joseph Mercy Hospital        | 2200 E. Grand Blvd. | 28          |
| Barlo General Hospital           | 292 E. Ferry        | 28          |
| McGregor Center                  | 8344 E. Jefferson   | 25          |
| Civic Hospital                   | 610 E. Grand Blvd.  | 18          |
| Trumbull General Hospital        | 3966 Trumbull       |             |
| Evangelical Deacons              | 3245 E. Jefferson   |             |
| Redford General                  | Grand River Blvd.   |             |

| Existing 200-Bed CDEH Stored in Southeast Michigan |             |                                  |              |
|--|-------------|----------------------------------|--------------|
| County   | City        | Location                         | Model No.    |
| Livingston   | Brighton    | Brighton City Fire Dept. Bldg.   | 55/355-7/57  |
|  | Howell      | County Court Bldg.               | 55/420-6/57  |
|  | Pinckney    | Putman Township Hall             | 55/354-6/57  |
| Monroe   | Carleton    | Airport School                   | 56/30-8/58   |
|  | Dundee      | Monroe County Road Commission    | 55/79-6/58   |
|  | Ida         | Ida Farmers Cooperative          | 56/31-8/58   |
|  | Monroe      | Monroe Port Commission Bldg.     | 55/380-6/58  |
| Oakland  | Lake Orion  | Lake Orion Jr. High School Annex | 56/32-8/58   |
|  | Milford     | Adm. Bldg. Proving Grounds       | 55/255-5/58  |
|  | Oxford      | Masonic Temple                   | 57/659-6/61  |
| St. Clair  | Marine City | Marine City Filtration Plant     | 55/257-5/58  |
|  | Marysville  | Marysville High School           | 55/257-12/57 |
|  | Yale        | Yale City Hall                   | 55/318-10/57 |
| Washtenaw  | Dexter      | Dexter City Fire Dept.           | 57/656-6/61  |
|  | Ypsilanti   | Ypsilanti State Hospital         | 57/658-6/61  |
| Wayne  | Detroit     | Redford Twp. OCD Storage Bldg.   | 56/197-10/59 |



Performance requirements can be expressed as reduction of loss of property and domestic animals, and as the degree of hardening--that is, amount of increase in PF or PV, number of square feet of space to be hardened, or amounts of critical materiel to be shielded.

- 6.2.1.5 Emergency Shutdown (F.9)--The shutdown mission is to protect property and life by eliminating losses due to secondary effects.

Performance requirements could be reduction of property damage and number of industrial installations shutdown.

- 6.2.1.6 Collection and Burial of Dead--The burial mission is to reduce health hazards by promptly collecting and transporting the dead to burial points, burying them, and registering the graves.

Performance requirements can be stated as the number of dead to be collected, distance to collection points, and man-hours to collect and bury the dead.

- 6.2.1.7 Debris Removal (F.16.1)--The debris clearance mission is to reestablish access to structures or use of transportation routes by removal of obstructions.

Performance requirements can be expressed as tons (or volume) of debris removed, miles of transportation routes cleared, and time to accomplish the task.

## 6.2.2 Components

### 6.2.2.1 Teams and Responsibilities:

|                      |  |
|----------------------|--|
| Headquarters Team    | Direct engineering operations for entire system (see Headquarters Operations Team).  |
| Group Controllers    | Direct engineering operations of teams in assigned mobilization zone.  |
| Sector Controllers   | Direct engineering operations of teams in assigned sector.   |
| Decontamination Team | Decontaminate essential areas in support of other service operations.  |
| Debris Removal Team  | Clear routes into and out of the damaged area to provide ready access to medical care centers, welfare reception centers, and other areas of safety; remove debris to facilitate firefighting and rescue of trapped survivors. |
| Repair Team          | Repair essential buildings behind damage lines in support of Welfare and Medical Services; restore essential facilities such as water and power.   |



**Demolition Team**

Demolish damaged buildings or structures to decrease hazards to adjacent facilities or traffic routes.

**Burial Detail Team**

Collect and bury dead.

**Reconnaissance Team**

Conduct aerial and ground reconnaissance to determine access routes for movement of survivors and the condition of emergency equipment, facilities, and utilities.

**6.2.2.2 Personnel Sources and Numbers**

|                               |       |
|-------------------------------|-------|
| City Plan Commission          | 55    |
| Housing Commission            | 395   |
| Municipal Parking Authorities | 1     |
| Public Lighting Commission    | 650   |
| Public Works Department       | 4,900 |
| Streets and Traffic           | 245   |
| Water Supply                  | 1,140 |

6.2.2.3 Communications--Local government radio system, Detroit Edison radio system, Michigan Consolidated Gas Company radio system, radio systems of private contractors, public telephones, and messengers are assigned as available.

6.2.2.4 Transportation--All vehicles ordinarily available to the Engineering Service and other vehicles by request to the Transportation Service represent the capability of the service.

6.2.2.5 Equipment and Supplies--Equipment and supplies of the combined city departments and items available to cooperating private agencies are allocated to the Engineering Service.

6.2.2.6 Facilities--Facilities are assigned from the cooperating departments and agencies (see Figure 12) and all private organizations engaged in engineering or construction activity.

6.2.3 Operations (see Figure 13).

**6.3 Fire Service (F. 7)**

6.3.1 Mission and Performance Requirements--The Fire Service will control fires, limit destruction of property, and rescue persons threatened by fire.

Performance requirements can be expressed as the reduction of property destruction, time to control a fire of a designated size, and reduction of deaths, illness, or injury caused by fire.

6.3.2 Components

6.3.2.1 Teams and Responsibilities:

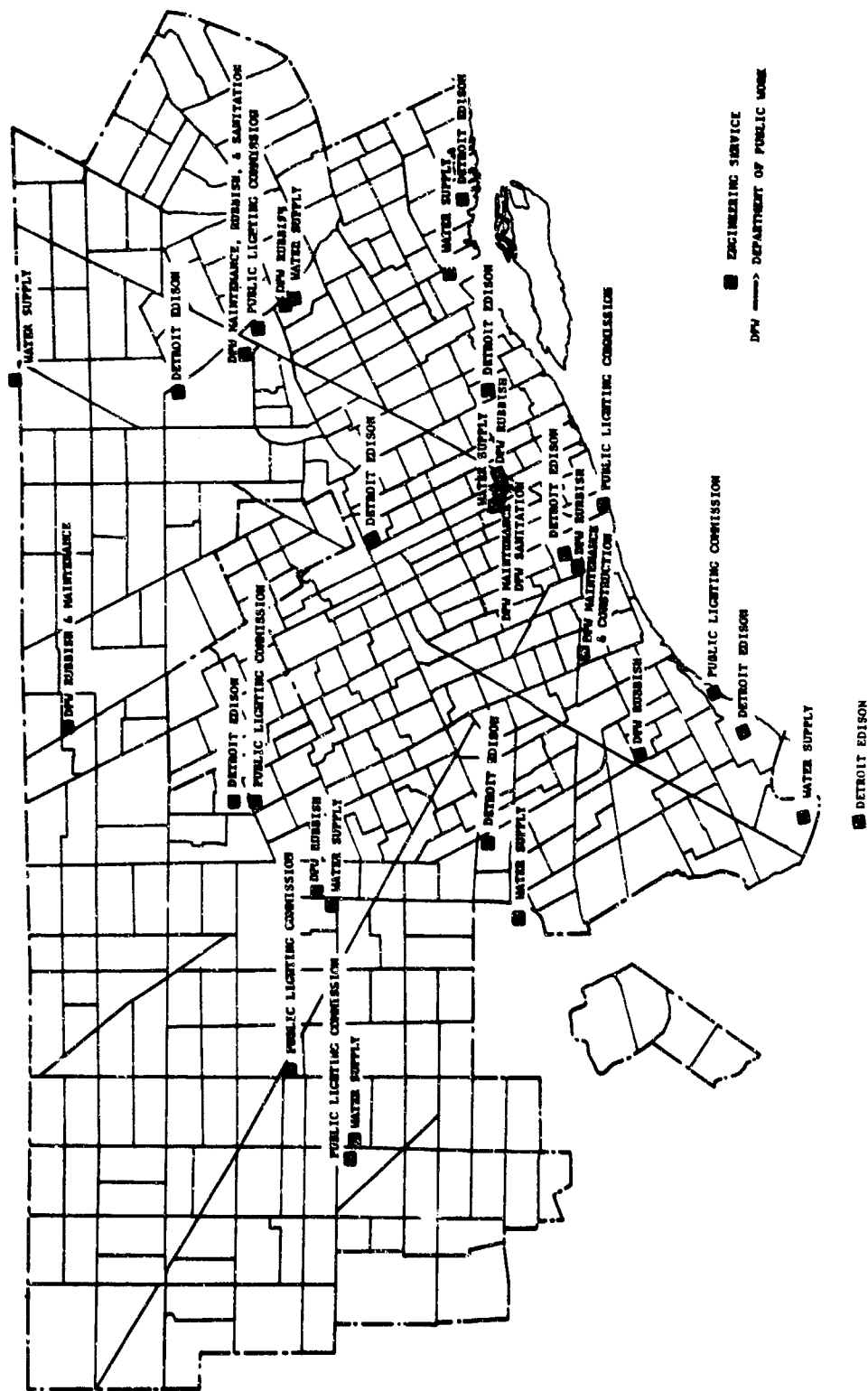
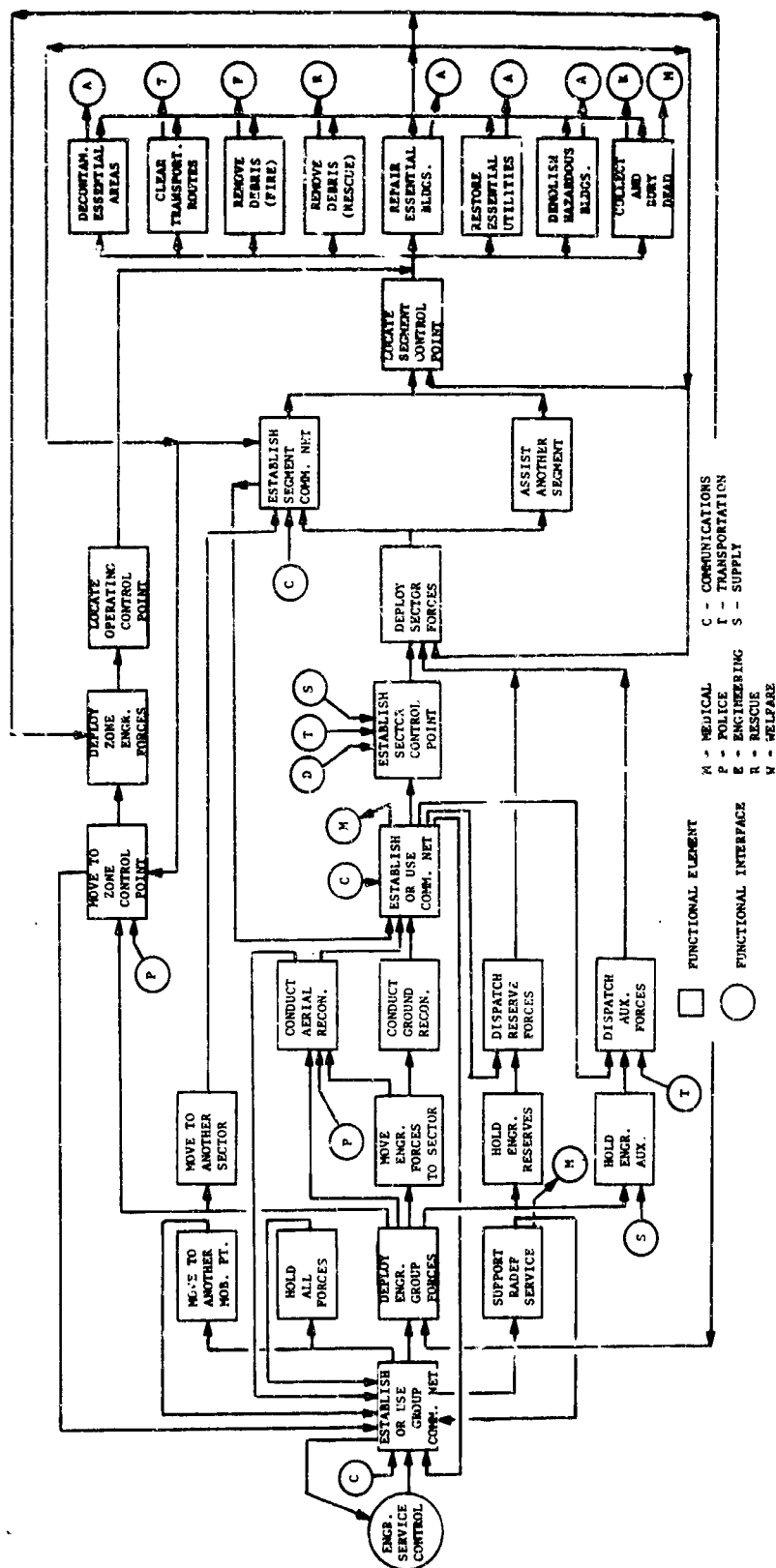


Fig. 12. Engineering Facilities Distribution.



During the preattack phase, the Engineering Services are dispersed to preassigned mobilization points. The group communication networks are established and activated between headquarters and the various group control units. During attack, operations are held in abeyance and personnel and equipment are kept sheltered. Following attack, group forces are deployed or held in reserve depending upon the existing situation. The group control unit may move to another mobilization point should the assigned point become untenable.

Based upon own and headquarters reconnaissance information, engineering group forces are deployed into assigned sectors. At the same time, engineers provide support to the BASE SERVICE. Engineer reserves and auxiliary forces are held and dispatched as necessary to support sector or segment operations with forces deployed into sectors. Ground reconnaissance backed up by aerial reconnaissance is conducted to establish a plan of action for the clearance of debris from major roads and for the restoration of facilities as required for the removal of survivors, fighting of fires, and the conduct of radiological monitoring.

At the same time that sector group forces are being deployed, zone control units may be set up, either within a sector or intersector, in areas behind the damage line to support Medical, Welfare, Shelter Services, etc.

Sector control points are established and sector control units activate communication networks. Communications are established vertically with group and headquarters and laterally with other sector control units. Once this has been done, sector forces are deployed toward the damage line to establish segment control points for the deployment of forces within a segment or to assist other segments.

Once segment communication networks have been activated, the segment control unit deploys its teams in support of Rescue, Fire, and Medical Services. Engineer team operations include, but are not necessarily limited to the following: removal of debris in support of the fire and rescue services; clearing of transportation routes for the removal of survivors and for the passage of required equipment; conducting of essential decontamination but not general decontamination; restoration of essential utilities and facilities such as power and water; repair of essential buildings and the demolition of hazardous buildings; and finally, when the situation has begun to stabilize, the collection and burial of the dead.

Fig. 13. Engineering Operations.

|                     |  |
|---------------------|--|
| Service Chief       | Direct firefighting operations for entire CD system (see Headquarters Operations Team).  |
| Group Controllers   | Direct firefighting operations of teams in assigned zone.  |
| Sector Controllers  | Direct firefighting operations of teams in assigned sector.  |
| Reconnaissance Team | Conduct aerial and ground reconnaissance to assess fire situations--that is, to locate fire lanes and points for fighting major fires and controlling minor scattered fires. |
| Engine Companies    | Fight minor fires to facilitate removal/rescue of survivors; fight major fires to control spread.  |
| Rescue Team         | Rescue people trapped by fires in structures.  |
| RADEF Team          | Monitor radiation levels to warn firefighting personnel; report radiation levels to RADEF stations.  |
| Ladder Companies    | Support the Engine Companies in fighting minor and major fires and the Rescue Teams in removing trapped survivors from tall buildings.                                       |

#### 6.3.2.2 Personnel Sources and Numbers:

|                          |       |
|--------------------------|-------|
| Fire Department          | 1,920 |
| Auxiliary Fire Service   | ?     |
| Industrial Fire Brigades | ?     |

6.3.2.3 Communications--Fire department radio and telephone systems, public telephones, and messengers are assigned as available.

6.3.2.4 Transportation--All departmental vehicles are assigned and additional trucks are provided on request by the Transportation Service.

6.3.2.5 Equipment and Supplies--Departmental, civil defense, and industrial fire equipment and supplies are allocated as available. Additional supplies are provided on request by the Supply Service as needed.

6.3.2.6 Facilities--All departmental installations and other facilities are assigned as available (see Figure 14).

6.3.3 Operations (see Figure 15).

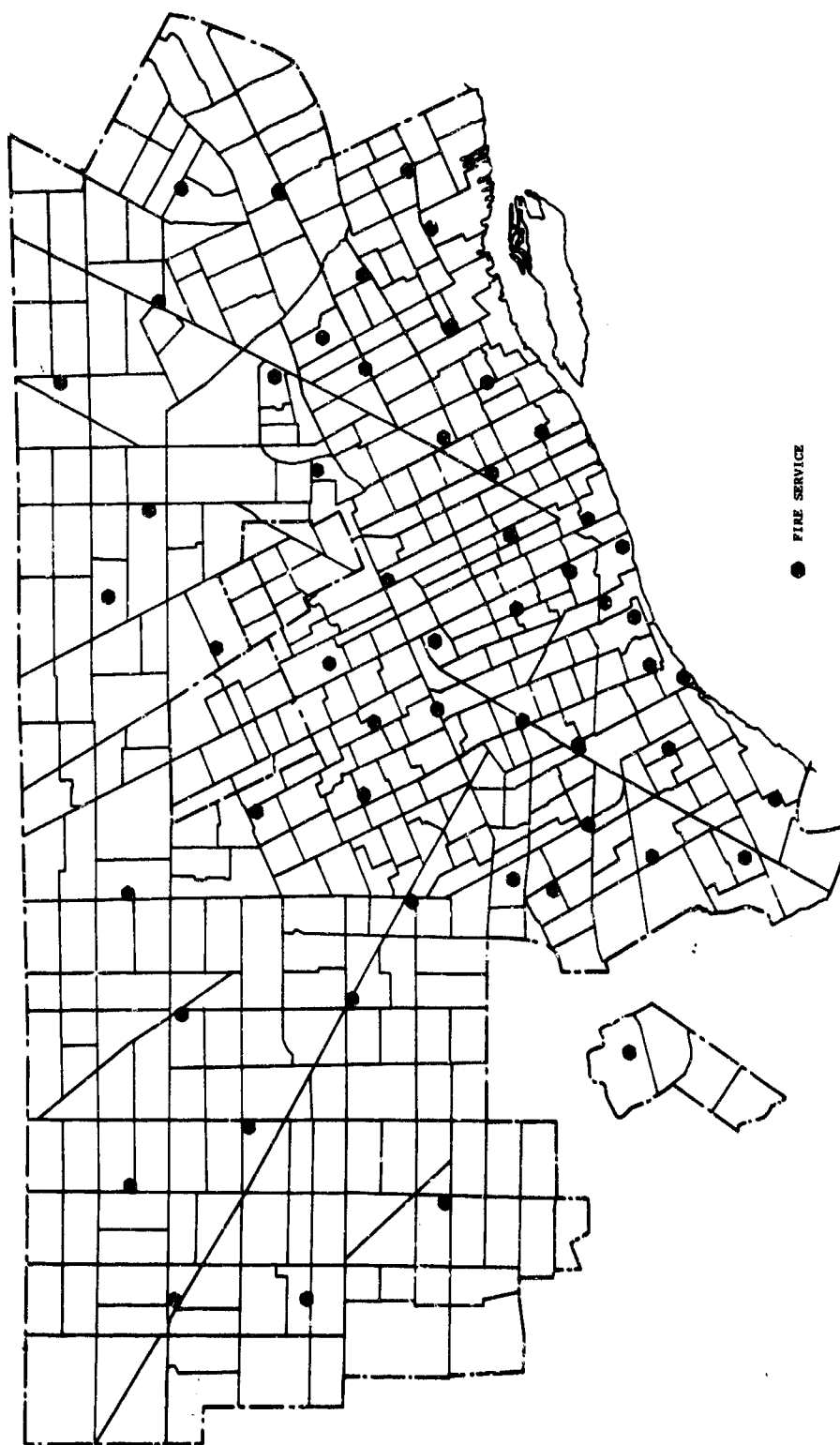


Fig. 14. Firefighting Facilities Distribution.



ducted by both the forces within a sector and by Headquarters. Deployed group forces establish sector communication networks and locate sector control points. The location of sector control points depends upon the state and extent of damage and the spread of fires within a sector. Once the sector control units have been established, the sector forces will be deployed to segments along the fire lines. Segment control units establish segment communication networks that are both vertical to group sector and headquarters, and lateral to other segments control units. Forces are deployed to fighting fires, monitoring radiation, and rescuing trapped persons. The primary functions of these teams is to try to control major fires and to knock down minor, scattered fires to facilitate the rescue and removal of survivors. Secondary functions are the rescue of trapped people and the monitoring of radiation levels.

**Fig. 15. Fire Service Operations.**

## 6.4 Police Service

### 6.4.1 Mission and Performance Requirements

- 6.4.1.1 General--The Police Service will establish sector headquarters on the perimeter of the disaster area to maintain law and order, to regulate traffic, and to control sector operations. The objective is to minimize interference with recovery operations.

Performance requirements could be set as the size of the area to be policed, number of refugees to be handled, volume and nature of traffic to be controlled, number and nature of incidents to be handled, amount and type of real property to be safeguarded.

- 6.4.1.2 Maintaining Law and Order (F.8.1)--The mission is to prevent crime, to arrest criminals, and to administer justice.

Performance requirements include size of area to be policed, number and nature of criminal incidents, amount and type of real property to be safeguarded.

- 6.4.1.3 Regulating Traffic (F.8.2)--The mission is to enforce public discipline, to restrict access, to control vehicular movement, and to control crowd movement.

Performance requirements can be expressed by volume and nature of traffic and the number and nature of mob incidents.

- 6.4.1.4 Control Sector Operations--The mission is to establish a sector headquarters and coordinate sector operations on the perimeter of disaster area.

Performance requirements can be set in terms of area to be controlled and time to establish control headquarters.

### 6.4.2 Components

#### 6.4.2.1 Teams and Responsibilities:

|                            |  |
|----------------------------|--|
| Service Chief              | Direct police operations for entire CD system (see Headquarters Operations Team).  |
| Group Controllers          | Direct and coordinate police operations and operations of all other services within assigned zones in the absence of direction from EOC.               |
| Sector Controllers         | Direct and coordinate police operations and operations of all other services within assigned sector in the absence of direction from higher authority. |
| Aerial Reconnaissance Team | Conduct aerial reconnaissance to evaluate and coordinate operations of all the services.   |

|                            |  |
|----------------------------|--|
| Ground Reconnaissance Team | Conduct ground reconnaissance to evaluate and coordinate operations of all services.   |
| Law Enforcement Team       | Enforce law and order to control assault, looting, and anarchy.  |
| Traffic Control Team       | Regulate movement of survivors from damaged areas to reception centers and emergency vehicles to and from damaged areas, and coordinate operations of all services at the segment level in the vicinity of damaged areas or firelines. |

#### 6.4.2.2 Personnel Source and Number

|                      |       |
|----------------------|-------|
| Police Department    | 4,890 |
| House of Corrections | 100   |

6.4.2.3 Communications--Detroit police department radio equipment (159.20/156.21/159.09 MC) are assigned as available.

6.4.2.4 Transportation--Departmental vehicles and authorized private vehicles are allocated as available.

6.4.2.5 Equipment and Supplies--Departmental equipment and supplies, all firearms and ammunition in the Detroit area, and civil defense trailers and equipment for sector headquarters are allocated as available.

6.4.2.6 Facilities--Departmental facilities and special facilities are assigned for protection of personnel and property (see Figure 16).

6.4.3 Operations (see Figure 17).

#### 6.5 Rescue Service

##### 6.5.1 Mission and Performance Requirements

6.5.1.1 General (F.4)--The Rescue Service will extricate people from damaged structures, inform shelter officials when it is safe to leave shelters, and provide transportation for remedial movements.

Performance requirements can be expressed as the distance, time, and number of people to be moved, and number of shelters to be notified.

6.5.1.2 Releasing Trapped People (F.4.1)--The mission is to extricate people from damaged buildings and blocked shelters.

Performance requirements can be expressed as number of people rescued and type of environment in which rescue is effected.

6.5.1.3 Transporting People in Remedial Movement (F.4.3)--The mission is to provide transportation required for remedial movement.

Performance requirements can be expressed as a reduction in numbers killed or man-days lost.



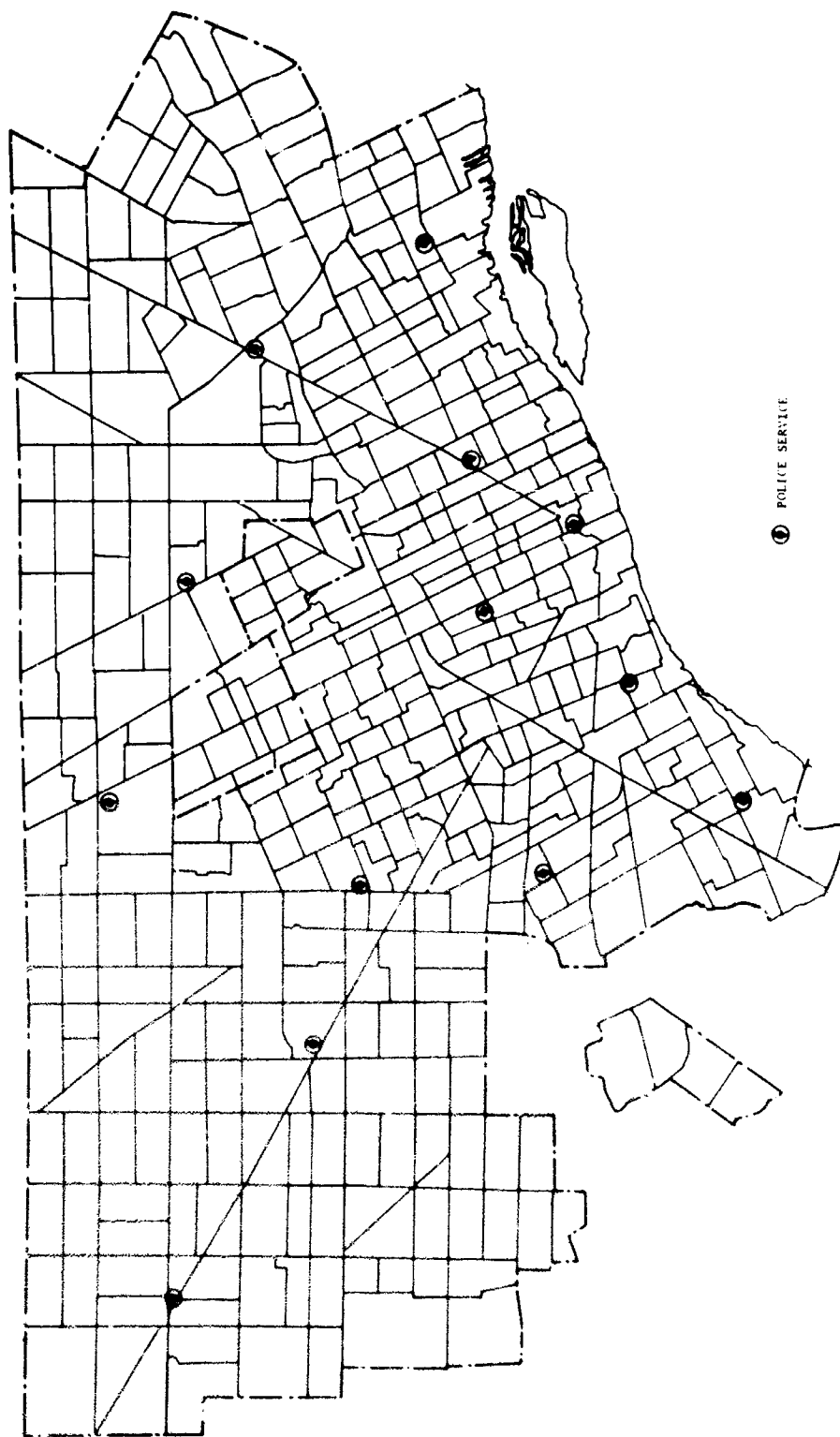


Fig. 16. Police Facilities Distribution.



- 6.5.1.4 Informing Sheltered They Can Leave (F.4.2)--Mission is to serve as alternate means of informing shelter officials.

Performance requirements could be expressed in reduction of man-days lost.

6.5.2 Components

6.5.2.1 Teams and Responsibilities:

|                        |   |
|------------------------|---|
| Service Chief          | Direct rescue operations for entire CD system (see Headquarters Operation Team).  |
| Group Controllers      | Direct rescue operations of teams in assigned zones.  |
| Sector Controllers     | Direct rescue operations of teams in assigned sectors.  |
| Reconnaissance Team    | Conduct aerial and ground reconnaissance of damaged areas to inform Sector and Group Controllers of local situations and to direct Rescue Teams to rescue sites.  |
| Rescue Team            | Locate and release trapped survivors; direct survivors to safer areas or aid the Collection Teams in removing nonambulatory, seriously injured to first aid centers or medical treatment centers; provide emergency first aid to injured survivors. |
| RADEF Monitoring Team  | Monitor radiation levels to warn rescue personnel; report radiation levels to RADEF stations.   |
| Remedial Movement Team | Use vehicles and drivers obtained from Transportation Service to remove survivors from damaged areas.   |

6.5.2.2 Personnel Source and Number:

|                                |       |
|--------------------------------|-------|
| Park and Recreation Department | 1,615 |
| Zoological Parks Commission    | 20    |

- 6.5.2.3 Communications--Park and Recreation Department radio network (159.33 MC) are assigned and augmented by civil defense communication equipment, telephones, and messengers as available.

- 6.5.2.4 Transportation--Park and Recreation Department vehicles are allocated to the Rescue Service and supplemented on priority request to the Transportation Service.

6.5.2.5 Equipment and Supplies--Park and Recreation Department rescue equipment and supplies and rescue equipment from industrial plants are allocated to the Rescue Service as available. Additional supplies are provided on request by the Supply Service.

6.5.2.6 Facilities--All Recreation Department facilities will be used (see Figure 18).

6.5.3 Operations (see Figure 19).

6.6 Welfare Service

6.6.1 Mission and Performance Requirements.

6.6.1.1 General--The Welfare Service will establish emergency centers to feed, house, and clothe survivors, to reunite families, and to provide permanent housing as soon as possible.

Performance requirements can be stated as the amount of food for a certain level of energy, number of people fed, number of temporary and permanent spaces, number requiring financial assistance, and type of assistance required.

6.6.1.2 Feeding (F.13)--The mission is to feed people who cannot provide food for themselves.

Performance requirements can be defined as the number of people to be fed in private homes and in centralized feeding places.

6.6.1.3 Housing (F.14)--The mission is to provide emergency lodging initially and permanent housing as time permits.

Performance requirements can be expressed as a reduction in the numbers of people without housing, the numbers of people to be provided community lodging and billeting; housing can be expressed as a reduction in man-days of lodging, number of people temporarily displaced, the number of uninhabitable housing units.

6.6.1.4 Other (F.18)--Other missions are to expedite reestablishment of normal living patterns by providing financial aid and minimum essential personal and family property and by reuniting families.

Performance requirements can include the number of people requiring financial aid, the number of families to be reunited, and quantities of clothing and other personal and family effects distributed.

6.6.2 Components

6.6.2.1 Teams and Responsibilities:

Service Chief

Direct welfare operations for entire CD system (see Headquarters Operations Team).

Group Controllers

Direct welfare operations of teams in assigned zone; coordinate operations with Shelter Management Teams.

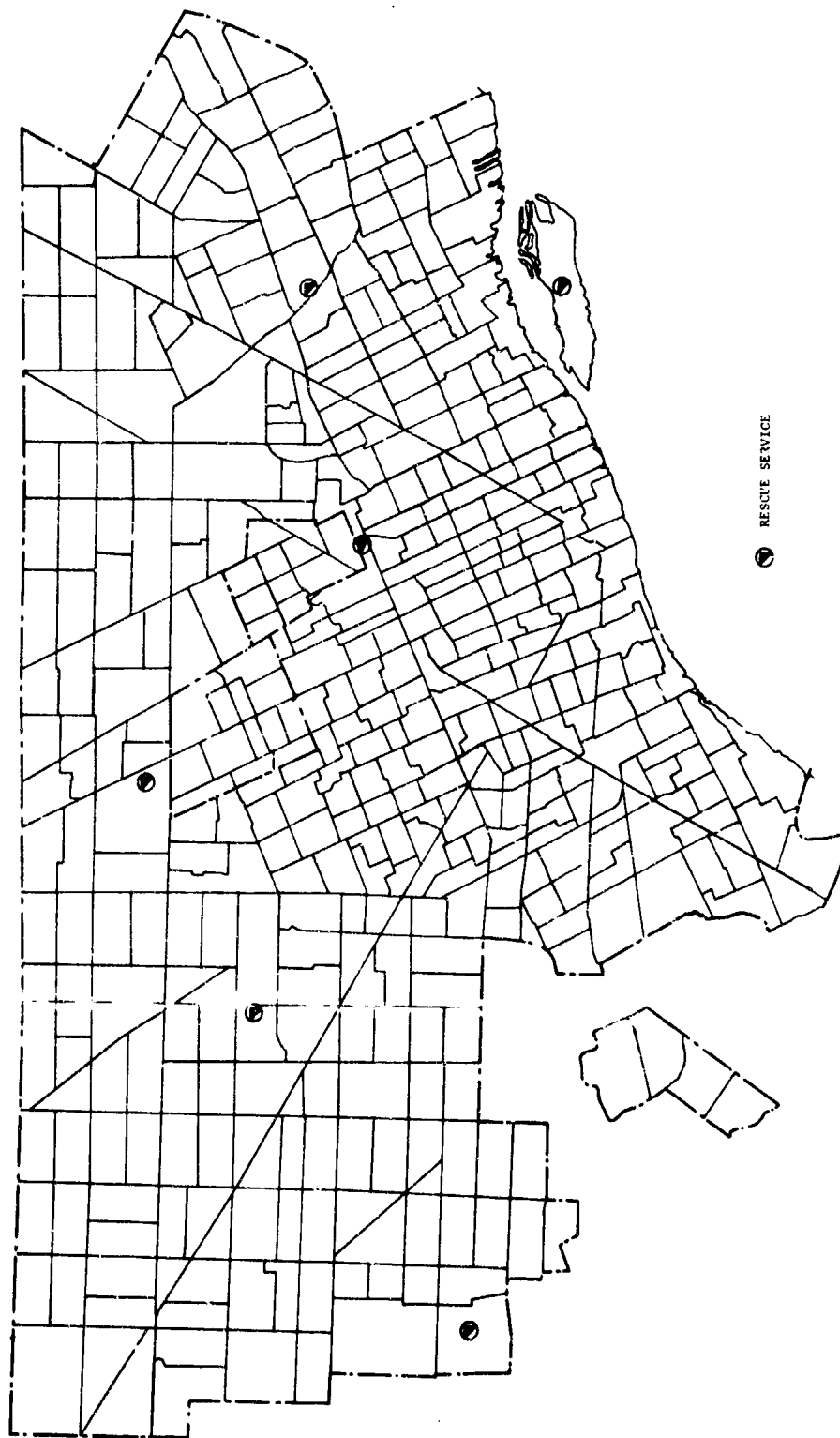
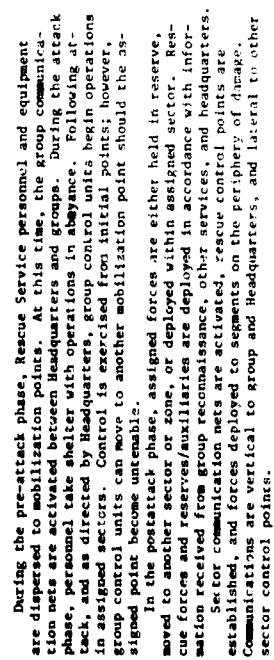


Fig. 18. Rescue Facilities Distribution.



At the same time sector control points are established, and behind the line of damage within a sector (or even intersector), zones may be established for areal rescue operations, redistribution of survivors, or providing assistance to shelter subsystem or welfare service.

Following deployment and establishment of sector control units, sector communication nets are established for control of segment control units, operating teams. This information system works vertically to teams, group, and Headquarters control units, as well as laterally between teams. Forces are deployed within segments as teams to perform specific functions with respect to survivors and the environment. Team operations include, but are not necessarily limited to, rescue of trapped persons, rendering first aid, disposal of survivors (directing), monitoring of radiation levels, and coordinating locally the use of transportation provided. This latter coordination includes assigned vehicles plus the mass transportation provided for remedial removal of survivors. The operating teams are the basic organizations for conduct of rescue operations.

**Fig. 19. Rescue Service Operations.**

|                         |  |
|-------------------------|--|
| Reconnaissance Team     | Conduct aerial and ground reconnaissance to locate centers for reception of survivors; determine routes for removal of survivors from one area to another; locate existing facilities to use for reception centers and mass lodging. |
| Mass Care Center Team   | Establish facilities for the mass reception and care of survivors.   |
| Registration Team       | Establish registration points for survivors within reception centers; communicate the information to a registration center.  |
| Mobile Kitchen Team     | Operate mobile kitchens to feed survivors; requisition and maintain food supplies at reception centers.  |
| Clothing Team           | Maintain and distribute supplies of clothing to survivors.   |
| Billeting Team          | Locate group lodging within reception areas; locate billets within surviving residential areas; assign survivors to billets or lodging in zones.   |
| Information Teams       | Establish points of inquiry; disseminate information to survivors.   |
| Public Assistance Teams | Administer aid programs for survivors at local level.  |

#### 6.6.2.2 Personnel Source and Number:

|                                       |     |
|---------------------------------------|-----|
| Arts Commission                       | 110 |
| Board of Assessors                    | 160 |
| General Auditor                       | 40  |
| Aviation Commission                   | 5   |
| Buildings and Safety Engineering      | 90  |
| Commission on Children and Youth      | 10  |
| City Clerk                            | 15  |
| City Planning Commission              | 22  |
| City Treasury                         | 153 |
| City Center Commission                | 104 |
| Commission on Community Relations     | 20  |
| Election Commission                   | 42  |
| Fire Department                       | 10  |
| Historical Commission                 | 53  |
| House of Correction                   | 110 |
| Industrial and Commercial Development | 4   |
| Commission on Skid Row                | 6   |
| Municipal Parking Authority           | 9   |

|   |     |
|---|-----|
| Parks and Recreation (Dept. of)           | 180 |
| Public Lighting Commission                | 25  |
| Public Works (Dept. of)                   | 100 |
| Rapid Transit Commission                  | 1   |
| Recorders Court (Traffic Division)        | 270 |
| Street Railways (Dept. of)                | 80  |
| Streets and Traffic (Dept. of)            | 5   |
| Total Action Against Poverty<br>Committee | 800 |
| Water Supply (Dept. of)                   | 95  |

- 6.6.2.3 Communications--Telephone and messenger services and RACES radio units are assigned as available.
- 6.6.2.4 Transportation--All vehicles assigned to the Welfare Service will remain under the control of the service. Additional vehicles will be furnished on priority request by the Transportation Service.
- 6.6.2.5 Equipment and Supplies--Equipment and supplies from industries for the preparation and handling of food and special equipment and supplies from OCD for shelters are assigned to the Welfare Service shelters. All food, clothing, and bedding supplies for the Welfare Service are allocated by priority from the Supply Service.
- 6.6.2.6 Facilities--Elementary school buildings and all other public and semipublic buildings not otherwise assigned (see Figure 20) will be assigned to the Welfare Service.
- 6.6.3 Operations (see Figure 21).



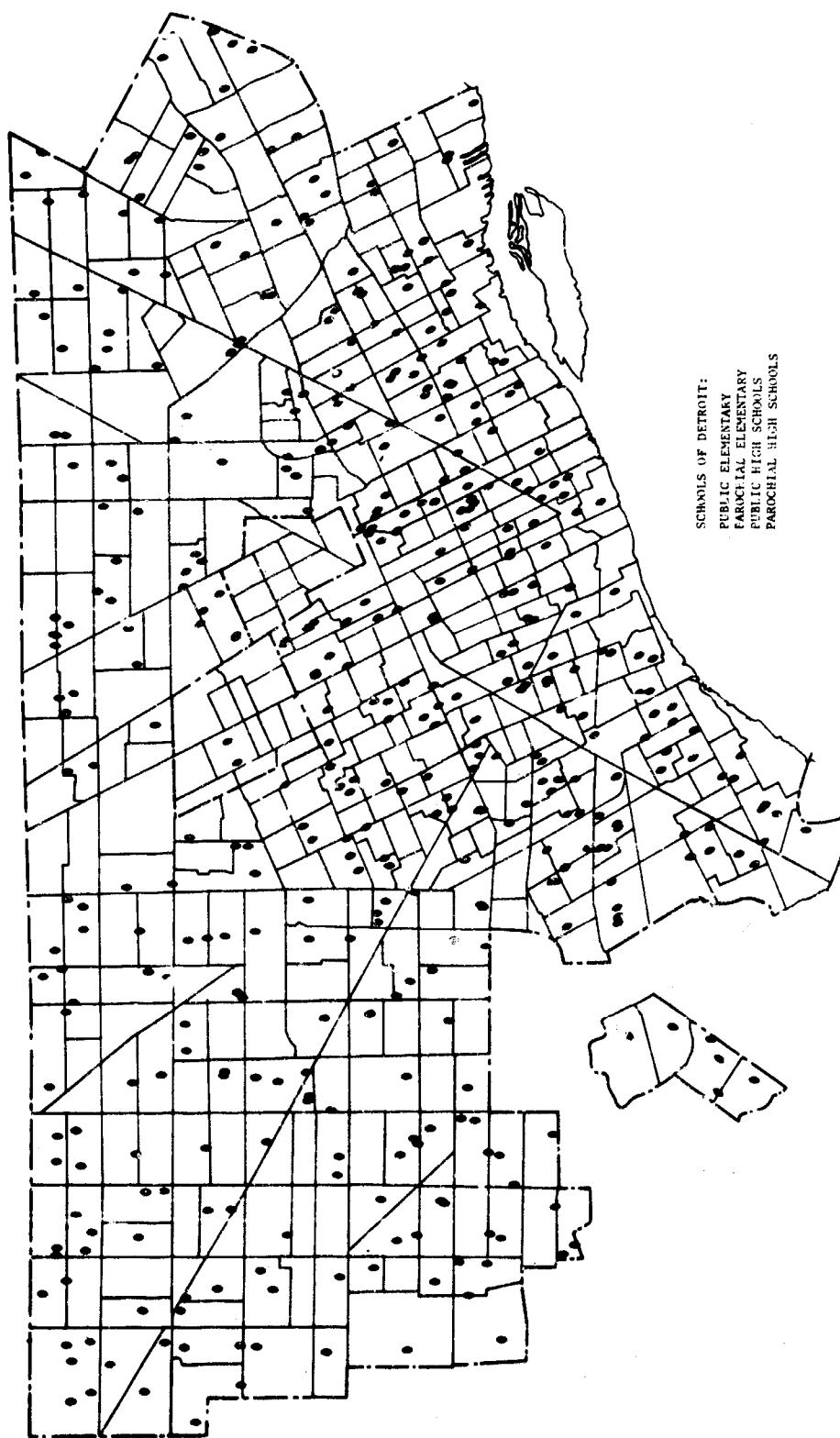
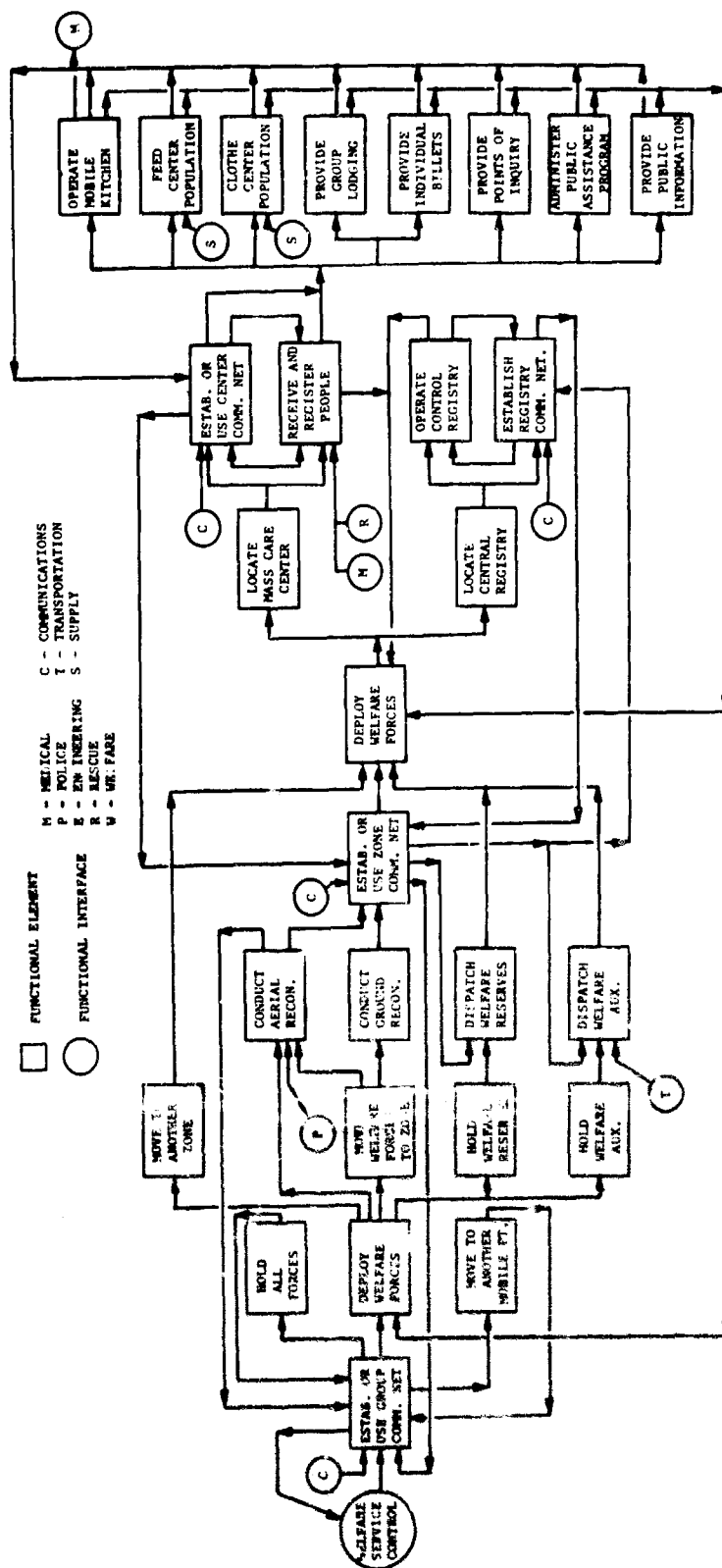


Fig. 20. Welfare Facilities (Schools) Distribution.



During the preattack phase, the Welfare Service is organized and dispersed with personnel and equipment to preassigned mobilization points. Group communication networks are activated and communications are established vertically to headquarters and laterally to other group welfare control units. During the attack phase, personnel take shelter. Immediately following the attack, the Welfare Service group control units evaluate the situation and begin to deploy their forces.

The Welfare forces are deployed in accordance with information received from both aerial and ground reconnaissance conducted by groups and Headquarters. The Welfare group control unit may have to move to another zone or mobilization point should the assigned point become untenable. Reserve and auxiliary forces are held in reserve and are dispatched as required to support the primary Welfare forces which are sent into the zone.

Welfare operates on a zone basis behind the damage lines and provides support to the other forces, such as: Medical, Rescue, Firefighting, and the charge of the removal and reception of survivors in reception

centers for housing and feeding and care. Zones are established behind the damage lines and cut across one or more of the sector areas. As the group Welfare forces are deployed, zone communication networks are established with vertical communications to both group and Headquarters control units and lateral communications to other Welfare forces in adjacent zones. The Welfare forces cooperate closely with the shelter subsystem management groups to care for the survivors that are in the shelters within the zone as well as to take care of mobile and non-mobile or ambulatory survivors that return to the zone from the area of damage. These survivors would be directed to the Welfare by the Police, Firefighting, and Rescue Service, at the least, and would generally be moved by the Transportation Service as part of a mass movement. This does not preclude the receipt of a number of survivors that would move on foot from the damage area. To take care of survivors, the Welfare forces within a zone would locate mass care centers. In addition, they would establish a central registry for identification of survivors and the eventual attempt to reunite families who have become separated during the emergency.

Fig. 21. Welfare Service Operations.

**Section 7.0**  
**SUPPORT SUBSYSTEM**

7.0 SUPPORT SUBSYSTEM

7.1 Transportation Service

7.1.1 Mission and Performance Requirements--The mission is to establish and operate transportation equipment and facilities.

Performance requirements can be expressed as the number of man-miles or ton-miles for which transport must be provided.

7.1.2 Components

7.1.2.1 Teams and Responsibilities:

|                         |   |
|-------------------------|---|
| Service Chief           | Direct transportation operations for entire CD system (see Headquarters Operations Team).   |
| Group Controllers       | Direct transportation operations of teams in assigned zones.  |
| Sector Controllers      | Direct operations of teams in assigned sectors.   |
| Reconnaissance Team     | Perform aerial and ground reconnaissance to establish routes for mass movement of survivors.  |
| Motor Pool Team         | Operate motor pools in zone and dispatch assigned vehicles as requested.  |
| Station Refueling Teams | Operate assigned zone or sector fueling stations.   |
| Mobile Refueling Team   | Operate refueling tank trucks.  |
| Maintenance Team        | Operate maintenance depots.   |
| Railroad Team           | Operate railroad equipment as directed by Group and Headquarters Control Teams.   |
| Aircraft Team           | Operate aircraft as directed by Group or Headquarters Control Teams.  |
| Transport Team          | Support other services with vehicles; operate mass transportation for removal of survivors from damaged areas to welfare and medical reception centers. |

7.1.2.2 Personnel Source and Number:

|                     |       |
|---------------------|-------|
| Aviation Commission | 30    |
| Public Works        | 265   |
| Street Railways     | 2,510 |

- 7.1.2.3 Communications--Telephones, messengers, and two-way radios are assigned as available in cooperating agencies.
- 7.1.2.4 Transportation--All transportation equipment and facilities not specifically assigned to other services will be assigned to the Transportation Service.
- 7.1.2.5 Equipment and Supplies--Equipment from the Department of Street and Railways; motor coach lines operating in Detroit; Department of Public Works (Motor Transportation Division); commercial vehicles operating in Detroit; railroad equipment operating in the Detroit area as assigned by Railroad Committee; air transport facilities in Detroit at time of alert (except planes of over 12,500 pounds); and all maintenance and fueling equipment and supplies for motor, rail, and air transport will be assigned to the Transportation Service.
- 7.1.2.6 Facilities--All public and private facilities for warehousing, shipping, and vehicle maintenance will be assigned to the Transportation Service. (see Figure 22 for public facilities and Figures 23 and 24 for highway and rail distribution).

7.1.3 Operations (see Figure 25)

7.2 Communication and Warning Service

- 7.2.1 Mission and Performance Requirements--Operate emergency communications and warning systems.

Performance requirements can be expressed in terms of a desired reaction and the percentage of the population so reacting.

7.2.2 Components

7.2.2.1 Teams and Responsibilities:

|                         |  |
|-------------------------|--|
| Service Chief           | Direct for entire CD system Communication Service (see Headquarters Operations Teams). |
| Radio Team              | Operate and service assigned radio equipment.  |
| Mobile Radio Team       | Operate and service field radio equipment as assigned.                                 |
| Radio Maintenance Team  | Repair radio equipment.  |
| EBS Teams               | Operate and maintain EBS.  |
| Telephone Operator Team | Operate switchboard; receive and transmit messages.                                    |
| Telephone Repair Team   | Install and repair lines and field telephone equipment.                                |
| TWX Operator Team       | Operate teletype equipment.  |

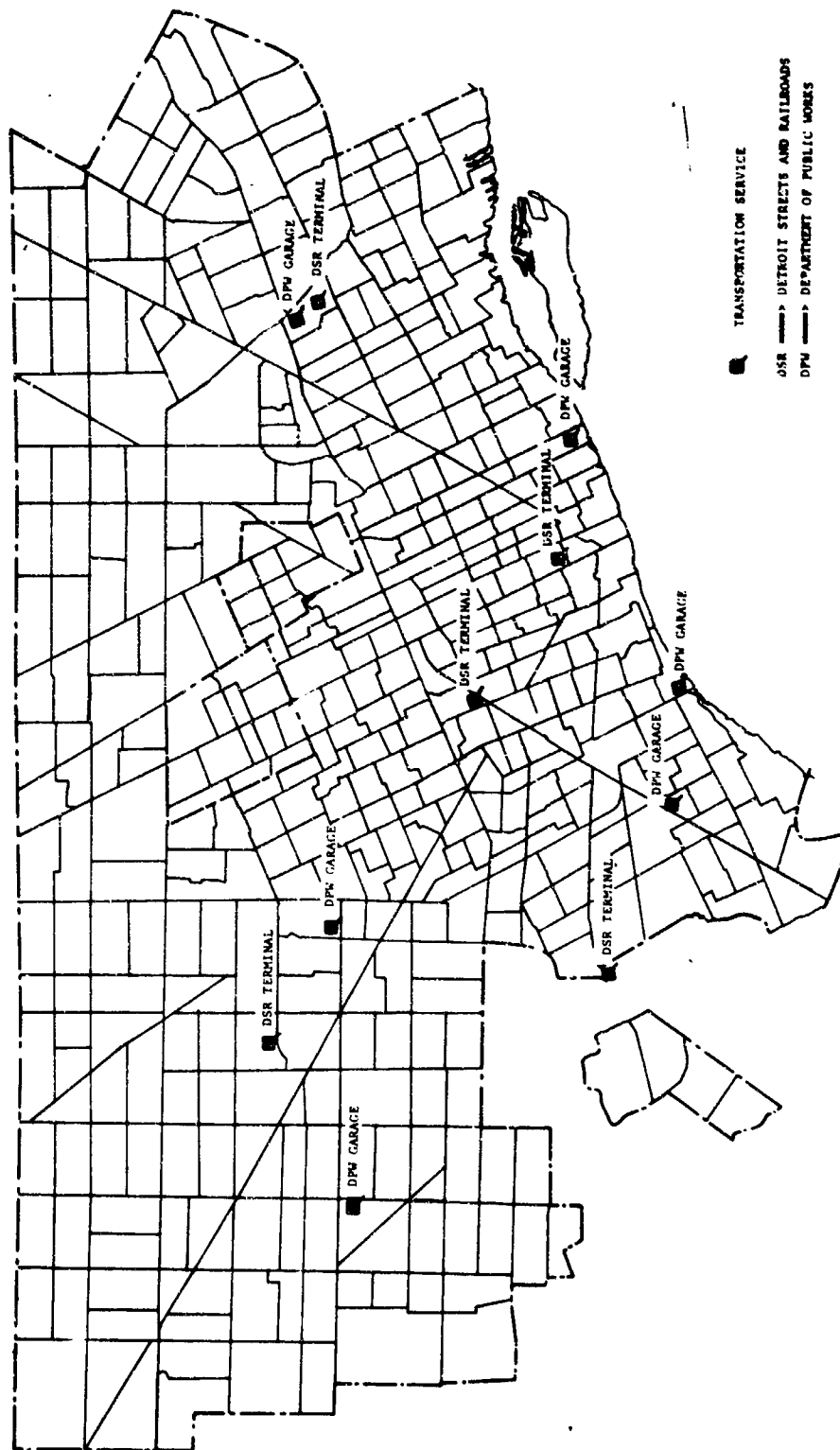


Fig. 22. Transportation Facilities Distribution.

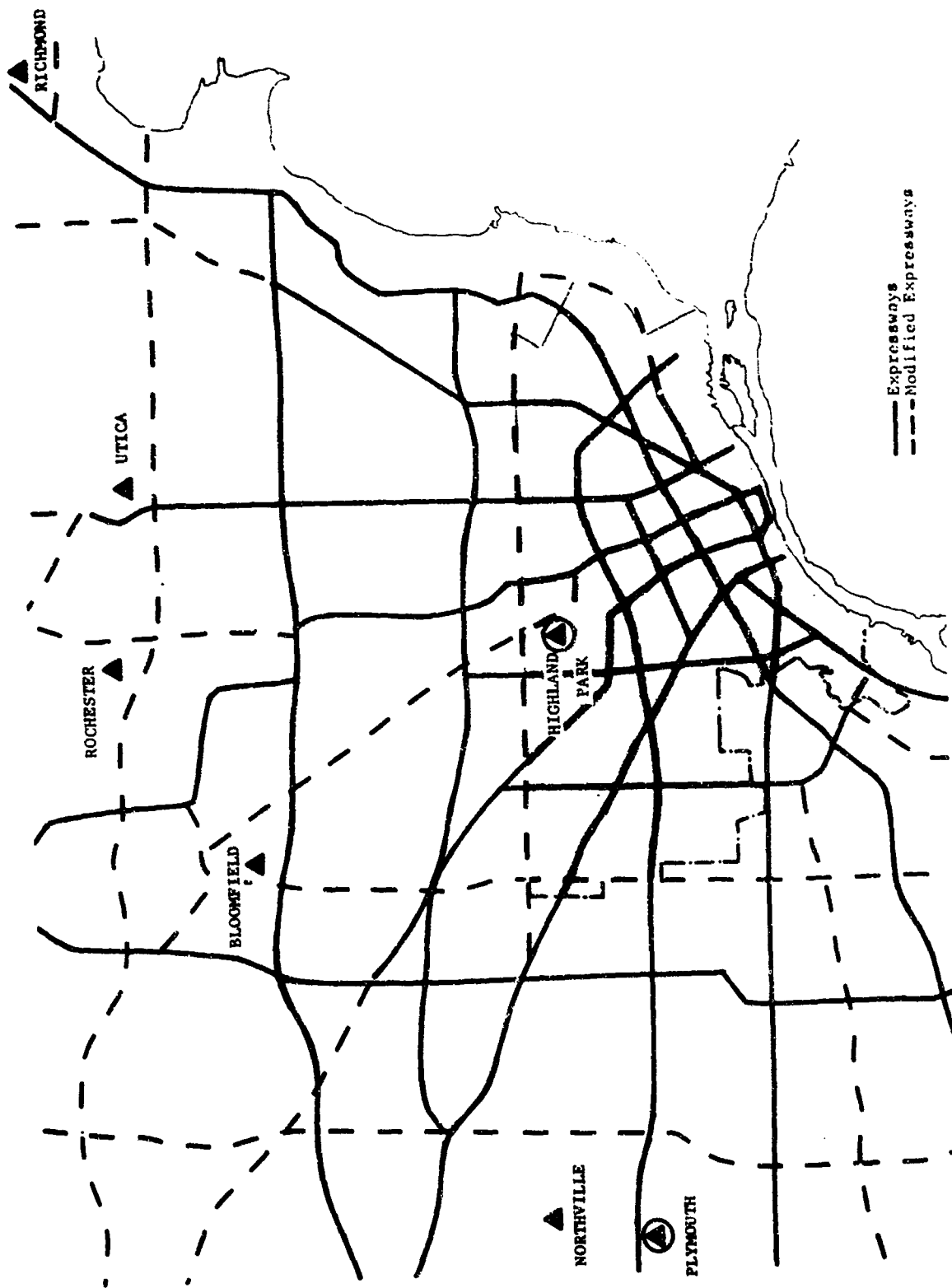


Fig. 23. Major Highway Distribution.

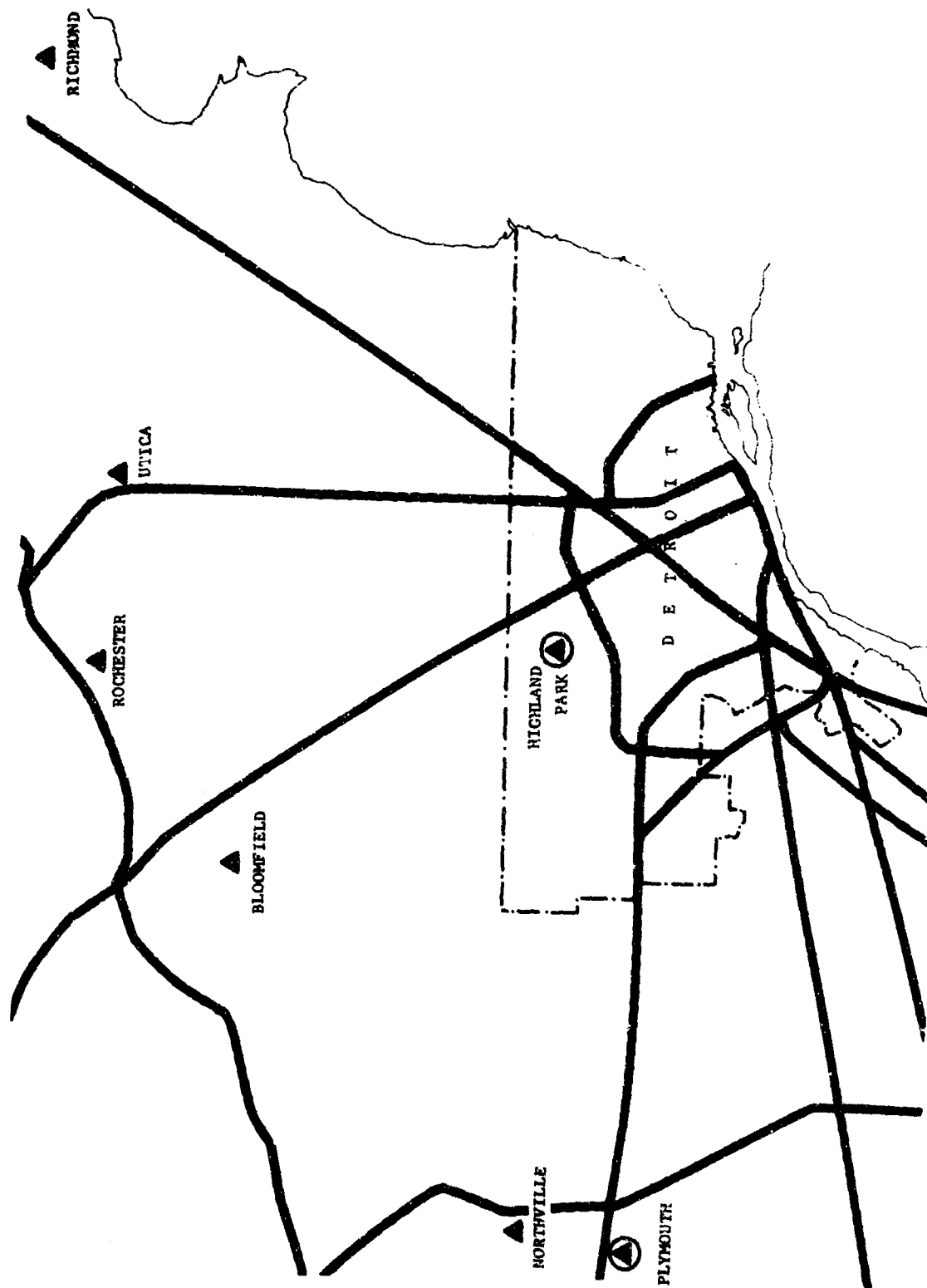
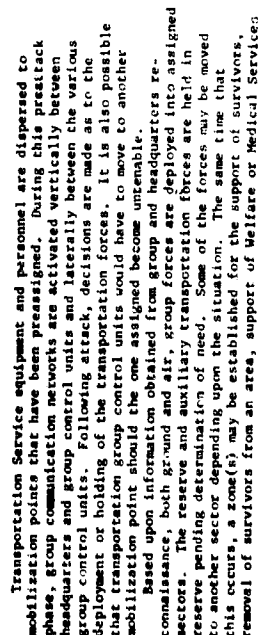


Fig. 24. Major Rail Distribution.





Based upon reconnaissance, sector control points are located and sector communication networks are established and activated--vertical to both group and headquarters and lateral to other sector control units. Upon establishment of the sector control point, sector forces are deployed to assigned segments, segment control points are established and segment communication networks are activated both laterally and vertically.

Transportation forces within a segment operate in support of the other services within that segment or adjacent segments. Requests for transportation can be received from Rescue Service, Medical Service, Fire Service, or Police. Transportation Services are supporting forces and not an operation in their own right. Within a segment, motor pools are operated, refueling and maintenance points are established, and transportation services are provided as required.

**Fig. 25. Transportation Service Operations.**

7.2.2.2 Personnel Sources and Numbers:

|  |    |
|--|----|
| Public Lighting Commission             | 85 |
| Dept. Report and Information Committee | 20 |
| Michigan Bell Telephone Company        | ?  |
| Inter-city Amateur Radio Association   | ?  |

7.2.2.3 Communications--Each civil defense service will have telephone and Time Wire Exchange (TWX) facilities at the main and alternate control centers. The Detroit police, fire, and PLC telephone systems are connected to the main control center and will be available to the departments controlling them. There is no plan, however, to extend these services to the alternate control center. Amateur radio systems will be available under the RACES program and will be assigned to support agencies that do not normally have radio systems.

7.2.2.4 Transportation--Special communications vehicles, trailers, and properly identified RACES mobile units will be assigned to the Communication Service.

7.2.2.5 Equipment and Supplies--Maintenance and repair equipment supplies for public and city-owned telephone systems; 75-meter, 2-meter, and 10-meter amateur-radio equipment; State Conservation radio, and all city-owned radio systems; radio facilities under the EBS will be controlled by the Communication Service (see Table III). Public air raid siren system installed at the fire stations will be assigned to the Communication Service for inspection and maintenance.

7.2.2.6 Facilities--Existing telephone exchanges and short-wave base stations, control center installations, and mobile communication centers are assigned to the Communication Service for maintenance (see Figures 26 and 27).

7.2.3 Operations (see Figure 28).

7.3 Supply and Personnel Service

7.3.1 Mission and Performance Requirements--Procure personnel, services, supplies, and equipment required during the emergency.

Performance requirements can be expressed in number, types, and time required to procure, stock, and issue supplies and equipment or to enlist, mobilize, and assign personnel.

7.3.2 Components

7.3.2.1 Teams and Responsibilities:

Service Chief

Direct supply operations for the entire CD system. (See Headquarters).

Group Controllers

Direct operations of supply and personnel teams in assigned zone.

TABLE III  
CIVIL DEFENSE RADIO SYSTEMS

| Service                     | Radio System  |
|-----------------------------|---|
| <u>C. D. Headquarters</u>   | 2-meter RACES<br>6-meter voice-RACES<br>7-meter RTTY-RACES<br>10-meter RACES<br>Mich. Dept. Conservation<br>Local Government  |
| <u>Public Information</u>   | Emergency broadcast (AM)  |
| <u>Medical</u>              |   |
| Health Dept.                | 10-meter RACES  |
| RADEF Service               | 10-meter RACES  |
| Fire Dept.                  | Fire Dept.  |
| Bldgs. & Safety             | Local government  |
| <u>Engineering</u>          |   |
| Dept. Public Works          | Local government  |
| Public Lighting Commission  | Public Lighting   |
| Dept. Water Supply          | Water Dept.   |
| Detroit Edison              | Detroit Edison  |
| Mich. Consolidated Gas      | Mich. Consolidated Gas  |
| <u>Fire</u>                 | Fire Dept.<br>Zone Headquarters (portable units)<br>Hand-carried equipment (field use only)   |
| <u>Police</u>               | East Side City<br>West Side City<br>Central City<br>Metropolitan Area City<br>Radiotelegraph<br>Hand-carried equipment (field use only)<br>Police communications trailer<br>Sector trailers 2-meter RACES |
| <u>Rescue</u>               |   |
| Parks and Recreation Dept.  | Forestry Division   |
| <u>Welfare</u>              |   |
| Welfare Department          | 10-meter RACES  |
| <u>Transportation</u>       |   |
| DPW-Motor Transportation    | Local government  |
| Nat'l. Defense Trans. Assn. |   |
| Trucking firms              | As available  |
| Railroads                   | As available  |
| Water transportation        | As available  |
| Dept. Street Railways       | DSR   |
| Detroit Aviation Commission |   |
| Privately owned aircraft    | As available  |
| <u>Communication</u>        | Taxicab (to be assigned)  |



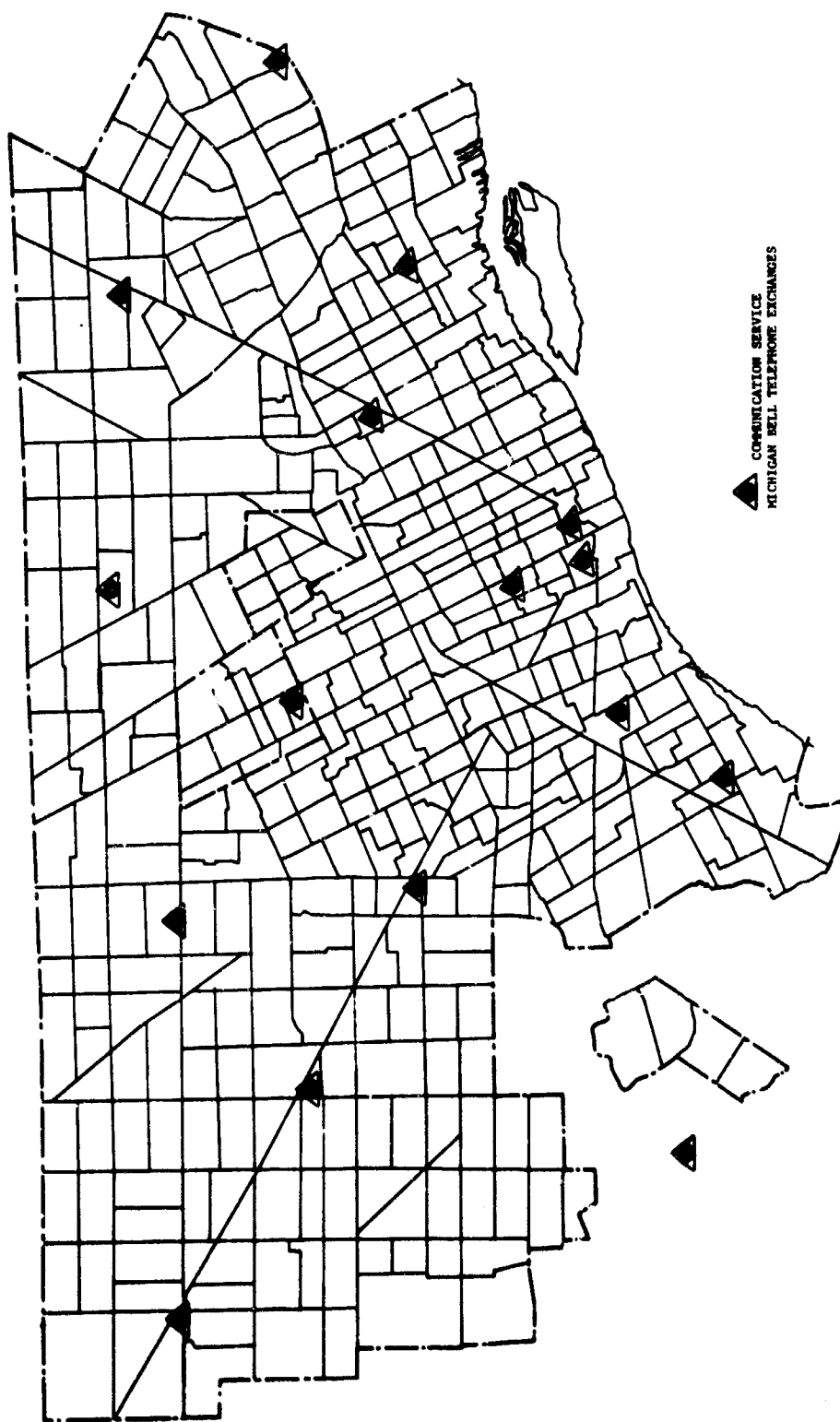
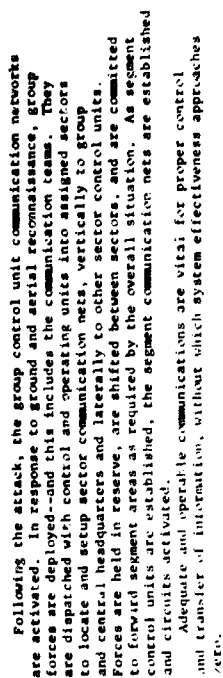


Fig. 27. Telephone Exchange Distribution.



**Fig. 28. Communication Service Operations.**

The Communications Service allocates personnel and equipment to mobilization points during the preattack (tactical) phase. At both headquarters and stamp control unit location, communication networks are established and activated. Links are established by radio and microwave, both internally within the City of Detroit Civil Defense system and externally to higher-level headquarters. Primary and alternate routes are developed and either put in use or kept on standby during the tactical planning stage and postattack (survival) phase of the emergency. The communications forces are mobilized and assigned to the control units and operating forces as required and available.

A number of distinct communication links are established, such as: QUAS, delivery (filament), emergency broadcast (radio/teletype), shelter evacuee warning, data link, and RAUMS.

|                     |   |
|---------------------|---|
| Sector Controllers  | Direct operations of supply teams assigned in sector.   |
| Reconnaissance Team | Conduct aerial and ground reconnaissance to locate supplies and equipment and to locate facilities for storage of equipment and supplies.                       |
| Procurement Team    | Make arrangements for purchase or confiscation of equipment and supplies required by CD forces.   |
| Facilities Team     | Establish welfare reception centers and medical facilities near shelters to store equipment and supplies; distribute equipment, supplies, and food as directed. |
| Civil Service Team  | Locate personnel from among survivors to aid all services to accomplish their missions.   |
| Stock Control Team  | Issue equipment and supplies.   |

**7.3.2.2 Personnel Sources and Numbers:**

|                          |     |
|--------------------------|-----|
| City Controller          | 234 |
| Civil Service Commission | 104 |
| Purchases and Supplies   | 113 |

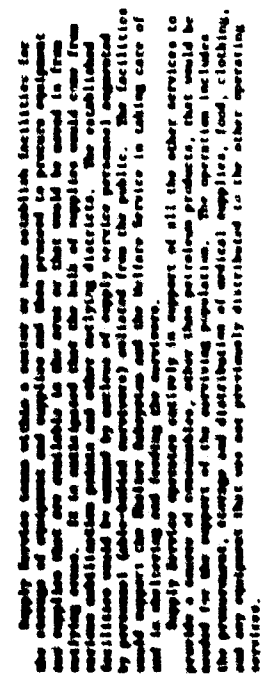
**7.3.2.3 Communications--Telephone and messenger services are assigned as available.**

**7.3.2.4 Transportation--City-owned passenger vehicles and other vehicles as requested and allocated from Transportation Service.**

**7.3.2.5 Equipment and Supplies--All equipment and supplies designated as civil defense controlled items not specifically allocated to another service will be controlled by the Supply Service. No general assignments.**

**7.3.2.6 Facilities--Space will be provided at main and alternate control centers for Headquarters Team. Space will be made available as needed at mobilization points and field headquarters locations for other teams. Buildings required for control of equipment and supplies will be allocated to the Supply Service.**

**7.3.3 Operations (see Figure 29)**



**Fig. 29. Supply and Personnel Service Operations.**



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A local civil defense system is conceptualized as a four-component organization, consisting of resources derived from the community, and working together as subsystems to solve local problems resulting from a nuclear attack. Central control (headquarters) directs and coordinates the other three. The shelter (central countermeasure) subsystem is concerned with warning, guiding to shelter, shielding, and sustaining occupants during and following the attack, as well as radiological monitoring to determine whether it is unsafe to stay or safe to leave shelter. The extra-shelter subsystem is a mobile force put together to fight fires, clear debris, rescue, assist in remedial movement, and to otherwise overcome environmental hazards affecting the safety of the sheltered population. Finally, the support subsystem assists the other three by providing communication, transportation, supplies, and personnel; this subsystem responds to requests from the other subsystems rather than initiating action in defense of the population. This concept of assigning responsibilities is comparable to the efficient military organizations which have proven most successful in emergency situations.

CIVIL DEFENSE SYSTEMS, SYSTEMS SYNTHESIS, SYSTEMS ANALYSIS, COMPONENTS, MISSIONS, OPERATIONS, DIAGRAMS

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CIVIL DEFENSE SYSTEMS, SYSTEMS SYNTHESIS, SYSTEMS ANALYSIS, COMPONENTS, MISSIONS, OPERATIONS, DIAGRAMS

THE RESEARCH TRIANGLE INSTITUTE, Research Triangle Park, North Carolina  
OCD Work Unit 4113E - Preliminary Report R-OU-210-2

Detroit Civil Defense Operation System Synthesis - Volume I Preliminary System Description  
Preliminary Report.

Robert N. Hendry, January 1968. (UNCLASSIFIED)

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